

CONSENT DECREE

APPENDICES

AMENDED RECORD OF DECISION	Appendix A
MAP OF SITE	Appendix B
LIST OF THE SETTling DEFENDANTS	Appendix C
EXPLANATIONS OF SIGNIFICANT DIFFERENCES	Appendix D

Appendix A

Amended Record of Decision

**ABEX CORPORATION SUPERFUND SITE
PORTSMOUTH, VIRGINIA**

RECORD OF DECISION AMENDMENT

**PREPARED BY
THE U.S. ENVIRONMENTAL PROTECTION AGENCY**

AUGUST 1994

**RECORD OF DECISION AMENDMENT
ABEX CORPORATION SUPERFUND SITE
PORTSMOUTH, VIRGINIA**

TABLE OF CONTENTS

PART I - DECLARATION

	Page
I. SITE NAME AND LOCATION	1
II. STATEMENT OF BASIS AND PURPOSE	1
III. ASSESSMENT OF THE SITE	1
IV. DESCRIPTION OF THE SELECTED REMEDY	1
V. STATUTORY DETERMINATIONS	7

PART II - DECISION SUMMARY

I. INTRODUCTION	9
II. SITE HISTORY AND ENFORCEMENT ACTIVITIES	12
III. HIGHLIGHTS OF COMMUNITY PARTICIPATION	14
IV. RATIONALE FOR CHANGING REMEDY SELECTED IN SEPTEMBER, 1992 ROD	14
V. SCOPE AND ROLE OF RESPONSE ACTION	15
VI. SUMMARY OF SITE CHARACTERISTICS	15
A. General Overview	15
B. Summary of RI Findings	17
VII. SUMMARY OF SITE RISKS AND CLEANUP LEVELS	19
A. Identification of Contaminants of Concern	20
B. Human Health Exposure Assessment	20
C. Human Health Toxicity Assessment	25
D. Toxicity Profiles For Contaminants of Concern	27
E. Human Health Risk Characterization	33
F. Future Risks Associated With Subsurface Soil	36
G. Ecological Risk	37
H. Lead Cleanup Levels	37

TABLE OF CONTENTS (Cont.)

	Page
VIII. DESCRIPTION OF ALTERNATIVES	38
A. Elements Common to Alternatives 4 & 8	38
1. Demolition of Former Foundry Facility Buildings on Holland Property	38
2. Soil Excavation and Off-Site Disposal	38
3. Temporary Relocation	39
4. Soil Treatment By Stabilization and/or Solidification	39
5. Discharge of Contaminated Water	40
6. Air Emissions Monitoring During Remedial Action	40
7. Transportation, Storage, Treatment and Disposal of Soil and Debris	40
B. Elements Specific to Alternative 4 or 8	41
1. Alternative 4	41
2. Alternative 8	41
IX. COMPARISON OF ALTERNATIVES ..	43
A. General Overview of Evaluating Criteria	43
1. Threshold Criteria	43
2. Primary Balancing Criteria	44
3. Modifying Criteria	44
B. Application of Evaluation Criteria to Alternatives 4 & 8	45
Threshold Criteria	45
1. Protection of Human Health and the Environment	45
2. Compliance with Applicable or Relevant and Appropriate Requirements.....	46
Balancing Criteria	48
3. Long-term Effectiveness and Permanence	48
4. Reduction of Toxicity, Mobility or Volume Through Treatment	48
5. Short-term Effectiveness	49
6. Implementability	50
7. Cost	51

TABLE OF CONTENTS (Cont.)

	Page
Modifying Criteria	51
8. State Acceptance	51
9. Community Acceptance	51
X. SELECTED REMEDY AND PERFORMANCE STANDARDS	52
A. Soil Excavation	52
B. Soil Treatment And Disposal	55
C. Building Demolition	56
XI. STATUTORY DETERMINATIONS	57
A. Protection of Human Health and the Environment .	57
B. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	58
1. Chemical-Specific ARARs	58
2. Location-Specific ARARs	59
3. Action-Specific ARARs	59
C. Criteria, advisories, or Guidance To Be Considered (TBCs)	60
D. Cost Effectiveness	61
E. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable	61
F. Preference for Treatment as Principal Element ..	61
XII. DOCUMENTATION OF SIGNIFICANT CHANGES	61
 PART III - RESPONSIVENESS SUMMARY	
I. INTRODUCTION	62
II. MIGRATION OF LEAD UNDER COVERED AREAS	62
III. EXCAVATION OF LEAD TO A DEPTH OF ONE FOOT	63
IV. HOMEOWNER'S CONCERN IF HOMES ARE NOT PURCHASED	64
V. FAIR COMPENSATION TO HOMEOWNERS	64
VI. COMMENTS RECEIVED PRIOR TO PUBLIC COMMENT PERIOD	65

LIST OF FIGURES

Figure 1 - Site Location Map.....	10
Figure 2 - Map of Site Features.....	11

LIST OF TABLES

Table 1 - Extent of Soil Contamination at the Abex Site	21
Table 2 - Activity Patterns for Exposed Residents.....	25
Table 3 Exposure Factors.....	26
Table 4 - Cancer Potency Factors.....	28
Table 5 - Reference Doses.....	29
Table 6 - Standard Assumptions for UBK Model.....	30
Table 7 - Baseline Risks for the Abex Site.....	35

**RECORD OF DECISION AMENDMENT
ABEX CORPORATION SUPERFUND SITE**

PART I - DECLARATION

I. SITE NAME AND LOCATION

Abex Corporation Superfund Site
Portsmouth, Virginia
Operable Unit One

II. STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) Amendment revises the ROD signed on September 29, 1992, for the Abex Corporation Site (Site), in Portsmouth, Virginia. This ROD Amendment presents the revised remedial action selected for Operable Unit One (OU1) at the Site. This revised remedy was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. §§ 9601 et seq. and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. This decision document explains the factual and legal basis for revising the remedy for this Site. An index of documents contained in the Administrative Record is included in Appendix A.

III. ASSESSMENT OF THE SITE

Pursuant to duly delegated authority, I hereby determine, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, that actual or threatened releases of hazardous substances from this Site, as discussed in Section VII (SUMMARY OF SITE RISKS AND CLEANUP LEVELS) of this ROD Amendment, if not addressed by implementing the remedial action selected in this ROD Amendment, may present an imminent and substantial endangerment to public health, welfare, or the environment.

IV. DESCRIPTION OF THE SELECTED

By this ROD Amendment, EPA is revising the remedy previously selected to address OU1 for the Site. This operable unit addresses contaminated soil and waste material present within an approximately 700-foot radius of the former Abex foundry facility located at the Site. The former foundry buildings will also be addressed as part of OU1. The selected remedial action for OU1 addresses the threat at the Site by excavating and treating the contaminated soil and waste material, by demolishing the

buildings associated with the former foundry operation, and by implementing institutional controls in commercial/industrial areas and under permanently covered areas where some contaminated soil exceeding health-based levels will remain in place. Treated material, soil containing low levels of contamination that do not require treatment, and building debris will be disposed of off-site in a permitted Resource Conservation and Recovery Act (RCRA) landfill.

Response actions began at this Site in 1986 when EPA identified high lead concentrations in the Abex foundry waste within the Abex Lot bounded by Seventh, Green, and Brighton Streets, in Portsmouth, Virginia and in soil of neighboring residential lots. Pursuant to a Consent Order signed with EPA in August of 1986, Abex excavated and removed contaminated soil at varying depths (generally 6 to 12 inches) from residential areas around the Abex Lot, primarily in portions of the Washington Park housing development (hereafter Washington Park development), the Effingham Playground, and around the Seventh Street row homes.

Additional high lead concentrations in soil in residential areas were identified in the Remedial Investigation and Feasibility Study (RI/FS) for OU1. The RI/FS was completed in February of 1992. Pursuant to a unilateral administrative order issued by EPA in March of 1992, Abex excavated and removed additional contaminated soil to a depth of approximately twelve inches in portions of the Washington Park development and the Effingham Playground. Excavation and removal of surface soil contamination in the Effingham residential areas as required under the March, 1992 Order has not been completed because the homeowners in the two-block residential area south of the Effingham Playground chose to wait for the long-term remediation involving both surface and subsurface excavation.

In April of 1992, EPA and the Commonwealth published for public comment a Proposed Plan describing several proposed remedial alternatives for the Site. Alternative 4 was selected as the preferred alternative. Public comments were received on the Proposed Plan and in September of 1992, EPA and the Commonwealth published a ROD selecting a final remedy for the Site. The preferred alternative selected in the September 1992 ROD (Alternative 4, with some minor modifications) required excavation down to the water table of soil exceeding 500 mg/kg of lead in residential areas and excavation down to the water table of soil exceeding 1,000 mg/kg of lead in commercial/industrial areas. Alternative 4 is described more fully below.

On October 19, 1993, Abex, one of the potentially responsible parties (PRPs) for the Site, submitted proposed changes to the ROD based on new information obtained from the City of Portsmouth (the "City") on proposed zoning and land-use plans and new institutional controls on future excavation within

the Site area. EPA conducted public availability sessions from November 8, 1993 to November 10, 1993 to solicit input from the affected residents on the PRPs' proposed changes to the ROD. Public availability sessions are small meetings that provide individuals and small groups with an opportunity to meet with EPA to voice their opinions about Site issues. The private homeowners responded favorably to the proposal. Some of the Washington Park development residents were still interested in permanent relocation, however, the majority of the residents were generally supportive of the proposal. Both the City and the Portsmouth Redevelopment and Housing Authority (PRHA) have indicated their support for the 1993 Abex proposal as well. After thoroughly evaluating the proposal and considering the responses to the proposal received from the affected residents during the November 8, 1993 public availability sessions, EPA issued a Proposed Plan to amend the 1992 ROD with its revised preferred remedy and published Notice of the Public Comment Period on February 17, 1994 in the Virginian-Pilot/Ledger-Star.

EPA held public availability sessions on February 23, 1994 in Portsmouth, VA, during the 30-day public comment period on the Proposed Plan. EPA also held a public meeting on February 24, 1994 to formally discuss the Proposed Plan and to receive comments.

The major components of the revised selected remedy (Alternative 8 in the Proposed Plan to Amend the 1992 ROD) for OU1 are set forth below. The revised selected remedy is based on the premise that: (1) the Effingham residential area, the Effingham playground, and the Seventh Street row homes will be rezoned commercial/industrial and will be occupied in a manner not inconsistent with such zoning classification; and (2) the institutional controls described in the remedy are in place no later than the completion of the preliminary remedial design for the remedy. If the proposed rezoning of residential areas to commercial/industrial has not occurred by that time, the areas specified above must be excavated to meet residential health-based levels, i.e., soil exceeding 500 mg/kg lead must be excavated down to the water table. If all necessary institutional controls are not approved by EPA and in place by that time, soil exceeding 500 mg/kg lead in the first foot and soil exceeding 1,000 mg/kg lead between twelve (12) inches and the water table will be excavated in areas within the scope of OU1 which are zoned commercial/industrial (except the Abex Lot, which will be addressed to the residential cleanup requirements).

- In areas zoned for residential use at the date of completion of the preliminary remedial design, surface and subsurface soils located between the surface and the water table which contain greater than 500 mg/kg lead will be excavated. Soils exceeding 500 mg/kg lead in the Abex Lot will also be excavated to the depth of the water table.

- In areas zoned for commercial/industrial or other non-residential uses (except the Abex Lot) at the date of completion of the preliminary remedial design, soil located between the ground surface and one foot depth which contains greater than 500 mg/kg lead will be excavated, and soil between one foot and two feet which exceeds 1,000 mg/kg lead in industrial areas will be excavated. Institutional land-use controls will be implemented to control any future excavation below two feet and to prevent exposure to contaminated soil.
- EPA will review, comment upon, and approve all institutional controls to be implemented as part of the remedial action for the Site. These institutional controls may include: an ordinance or regulation requiring a permit for, and imposing restrictions on, excavation in areas within OUI and requiring notice to EPA, the City, PRHA, and the public prior to excavation in such areas; the inclusion of provisions in deeds for properties within OUI providing notice of this CERCLA remedy and restricting excavation on such properties; and the placement of underground "warning sheets" in excavated commercial/industrial areas before backfilling with clean soil. The institutional controls must be sufficient to ensure (1) that soils below two feet in areas of OUI zoned commercial/industrial, as well as soils beneath permanent covers in all areas, are not disturbed after completion of this remedy without prior notice to EPA, the City, PRHA, and the public, and (2) if such soils are to be disturbed, the soils are managed in a manner which will not endanger public health or the environment.
- Excavated soil and waste materials from the Site will be tested using the Toxicity Characteristic Leaching Procedure (TCLP) to determine whether excavated soil is a RCRA characteristic hazardous waste. Soil which is determined to be a RCRA hazardous waste will be treated on-site prior to off-site land disposal. Soil which is not a RCRA hazardous waste will be treated to the extent and in the manner as may be required by the state to which such soils will be transported for off-site disposal. Conventional earth-moving equipment will be used to excavate and load the contaminated soil.
- Excavated soil and waste materials that exhibit toxicity using the TCLP will be treated by mixing such soil and waste materials with chemicals/reagents. The mixing will be contained in above-ground equipment on-site to create a final product that encapsulates and immobilizes lead and other metals. Specific chemicals to be used in the process remedial design phase of the project. Treated material will be tested using TCLP to ensure that it no longer exhibits

toxic characteristics. Soil/waste materials that no longer exhibit toxicity using TCLP shall be disposed of off-site in a permitted RCRA Subtitle D landfill. Soil/waste materials that continues to exhibit toxicity shall either be subject to additional treatment to further reduce toxicity, or be disposed of off-site in an approved RCRA Subtitle C landfill, after RCRA Land Disposal Restriction (LDR) requirements have been met.

- Soil beneath existing permanent covers such as buildings, parking lots, sidewalks, and streets will not be removed. These covers will be maintained and institutional land-use controls will be used to prevent future exposure to contaminated soil beneath such covers. The following existing permanent covers are not included in this provision and will be removed as part of the remedy: the asphalt covers on the Abex Lot, the McCready Lot, and the Holland Property, the former foundry buildings on the Holland Property, and, if rezoning occurs, the Effingham and Seventh Street residential homes¹.
- All excavated areas will be backfilled with clean fill. Formerly vegetated areas will be graded and reestablished to their original condition, to the extent practicable.
- Where excavation to the depth of the water table is required, excavation will occur during the period when the water table is at the seasonally low elevation, to the extent practicable.
- Prior to the excavation of contaminated soil on the Abex Lot, the McCready Lot, and the Holland Property, existing asphalt and concrete will be removed and tested using the TCLP. Debris which is determined not to be RCRA hazardous waste will be disposed of as construction and demolition debris. Debris that tests as hazardous under TCLP will be disposed of in accordance with RCRA Subtitle C requirements, including LDR regulations.
- The buildings associated with the former foundry operation on the Holland property, the Effingham residences, and the Seventh Street row homes will be demolished prior to the

¹ For purposes of this ROD Amendment, the term "permanent cover" shall not include buildings with crawl spaces that have dirt floors. Thus, if the Effingham and Seventh Street residential areas are not rezoned for commercial/industrial use by the completion of the preliminary remedial design and the homes are not demolished, further geotechnical investigations will be undertaken to determine an appropriate method of remediating the crawl spaces.

excavation of contaminated soil on these properties. Building debris resulting from such demolition will undergo TCLP testing and, if the debris tests as hazardous waste, it will be disposed of off-site in a landfill permitted in accordance with the RCRA and in accordance with RCRA LDR regulations. Equipment maintained by the current owner of the Holland Property within the buildings will have to be removed. Equipment which is contaminated with or constitutes a RCRA hazardous waste will be disposed of off-site in accordance with the requirements of RCRA Subtitle C, including the LDR requirements. Equipment which is not contaminated with or is not a RCRA hazardous waste, or which is decontaminated so that it no longer is contaminated with or constitutes a RCRA hazardous waste, may be used or disposed of off-site in a manner not inconsistent with applicable laws or regulations. Residuals generated as a result of decontamination activities will be tested under TCLP and disposed of as required by RCRA Subtitle C and any other laws or regulations which may be applicable to such wastes.

- Temporary relocation will be provided to residents while excavation is occurring around residential units. The extent of soil to be removed around each residential unit will be determined during the remedial design phase. The specific arrangements for temporary housing will be based on the extent of soil to be removed and the needs of the impacted residents. Efforts will be made to minimize inconvenience to residents. To the extent practicable, the U.S. Department of Transportation Uniform Relocation Act and accompanying regulations will be used as guidelines.
- Discharge of decontamination water and any other water generated during remedial activities will meet Virginia Pollution Discharge Elimination System (VPDES) requirements developed pursuant to the Federal Clean Water Act, 31 U.S.C. §§ 1251 et seq., and the Virginia State Water Control Law, Code of Virginia §§ 62.1-44.2 et seq. It is anticipated that most of the water generated by the Site activities will be recycled or re-used in the treatment process. The water that is not recycled will be treated, tested and sent off-site either to a wastewater treatment facility (if the water does not exceed the levels of lead that the treatment facility is permitted to accept) or treated on-site and discharged into the Elizabeth River. If the water is to be discharged into the Elizabeth River, it will have to meet all VPDES requirements.
- Dust suppression measures will be used to ensure that unacceptable releases of air-borne contamination do not occur. Air will be monitored for both dust and lead levels during remedial activities to protect the health of on-

site workers and the community. Sampling of the interior of homes in the vicinity of excavation will also be performed before, during, and after excavation to assure that the National Emission Standards for Hazardous Air Pollutants (NESHAPs) developed under the Federal Clean Air Act, 40 C.F.R. §§ 50.12 and 50.6, and the Virginia Regulations for the Control and Abatement of Air Pollution (VRCAAP), VR § 0401-0101, are not exceeded.

- Transportation, storage, treatment and disposal of soil and debris will be in compliance with applicable provisions of RCRA, federal regulations promulgated thereunder pursuant to HSWA at 40 C.F.R. Parts 260-271, the Virginia Hazardous Waste Management Regulations (VHWMR) Part VII, Regulations applicable to Transporters of Hazardous Waste (VR §§672-30-1), or Virginia Solid Waste Management Regulations (VR §§672-20-10).
- Excavated soil and waste materials shall be temporarily staged on-site prior to treatment and/or transportation to an off-site disposal facility; to the extent practicable, excavated soil and waste material shall be staged in areas of existing contamination, e.g., the Abex Lot, the Holland Property, McCready Lot, or the vacant lots; containment measures such as berms and temporary covers shall be used in areas with staged material to ensure that there are no unacceptable air or water-borne releases of contamination from these areas; these measures shall be sufficient to provide protection in the event of flooding; areas that are used to stage excavated material shall be secured with a fence to prevent trespassing. In all instances where soil and waste materials are staged in areas where cleanup has previously occurred or are otherwise not contaminated above levels requiring excavation, soil and waste material shall be staged in containers in accordance with RCRA regulations contained in 40 C.F.R. Part 268.50; containers used shall be in compliance with VHWMR § 10.8 Use and Management of containers.

V. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost-effective. The remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances

remaining on-site above health-based levels (i.e., 500 mg/kg lead under covered areas in Washington Park and above 1,000 mg/kg lead in soil below two feet in commercial/industrial areas), a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. Such reviews will be conducted every five years thereafter to ascertain that the hazardous substances remaining at the Site are properly contained and do not represent an exposure at the Site.

Peter H. Kostmayer
Regional Administrator
Region III, U.S. EPA

Date

**RECORD OF DECISION AMENDMENT
ABEX CORPORATION SUPERFUND SITE**

PART II - DECISION SUMMARY

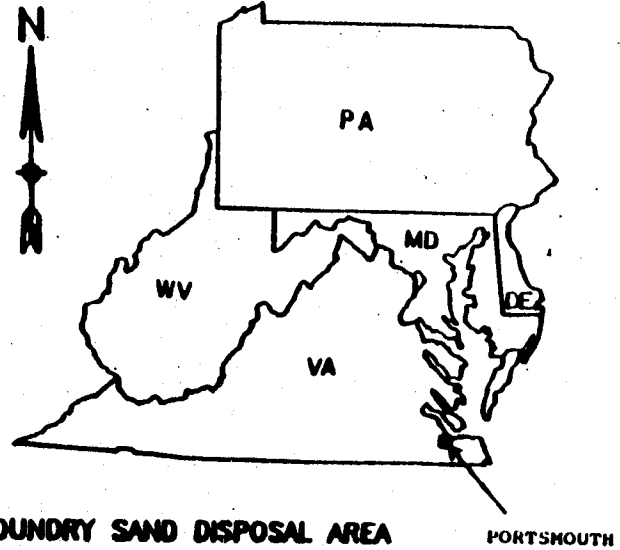
I. INTRODUCTION

The Abex Site (the "Site") is located in the eastern section of Portsmouth, Virginia, approximately 1.2 miles southwest of the confluence of the southern and eastern branches of the Elizabeth River (See Figure 1). Operable Unit One (OU1) of the Site encompasses a several block area with numerous parcels of land (See Figure 2). This operable unit contains the former Abex brass and bronze foundry, which is comprised of five buildings (hereinafter referred to as the Holland Property), and associated former waste sand disposal areas (hereinafter referred to as the Abex Lot and the McCready Lot). Other areas within the approximately 700-foot OU1 radius found to have contamination associated, at least in part, with the former foundry operation will also be addressed in this remedial action.

The locations of the OU1 properties are as follows: the Holland Property is located in the block bounded on the east by Seventh Street, on the south by Randolph Street, on the west by Green Street, and on the north by Brighton Street; the Abex Lot is located immediately north of the Holland Property; the Washington Park development is located both northeast of the Holland Property and north of the Abex Lot; the Effingham Playground is located west of the Holland Property; private residential properties (hereafter referred to as the Effingham residential area) are located south of the playground and southwest of the Holland Property; a drug rehabilitation center and a small shopping center are located south of the Holland Property; the McCready Lot is located southeast of the Holland Property at the northwest intersection of Randolph and Seventh Street; several row homes located north of the McCready Lot and immediately east of the Holland Property; and several vacant lots located east of Seventh Street. The Washington Park development, the Effingham Playground, and the Effingham residential area are currently zoned for residential use. The remaining properties are zoned for commercial/industrial use (see Figure 2).

The Remedial Investigation (RI) for OU1 identified lead as the primary contaminant of concern at the Site. Lead was detected in soil on the Holland Property, under the asphalt-capped Abex and McCready Lots, and in surrounding residential and commercial/industrial areas at levels that pose an actual or potential threat to human health and the environment.

FIGURE 1 - SITE LOCATION MAP



FOUNDRY SAND DISPOSAL AREA

PORTSMOUTH

FORMER LOCATION OF ABEX FOUNDRY

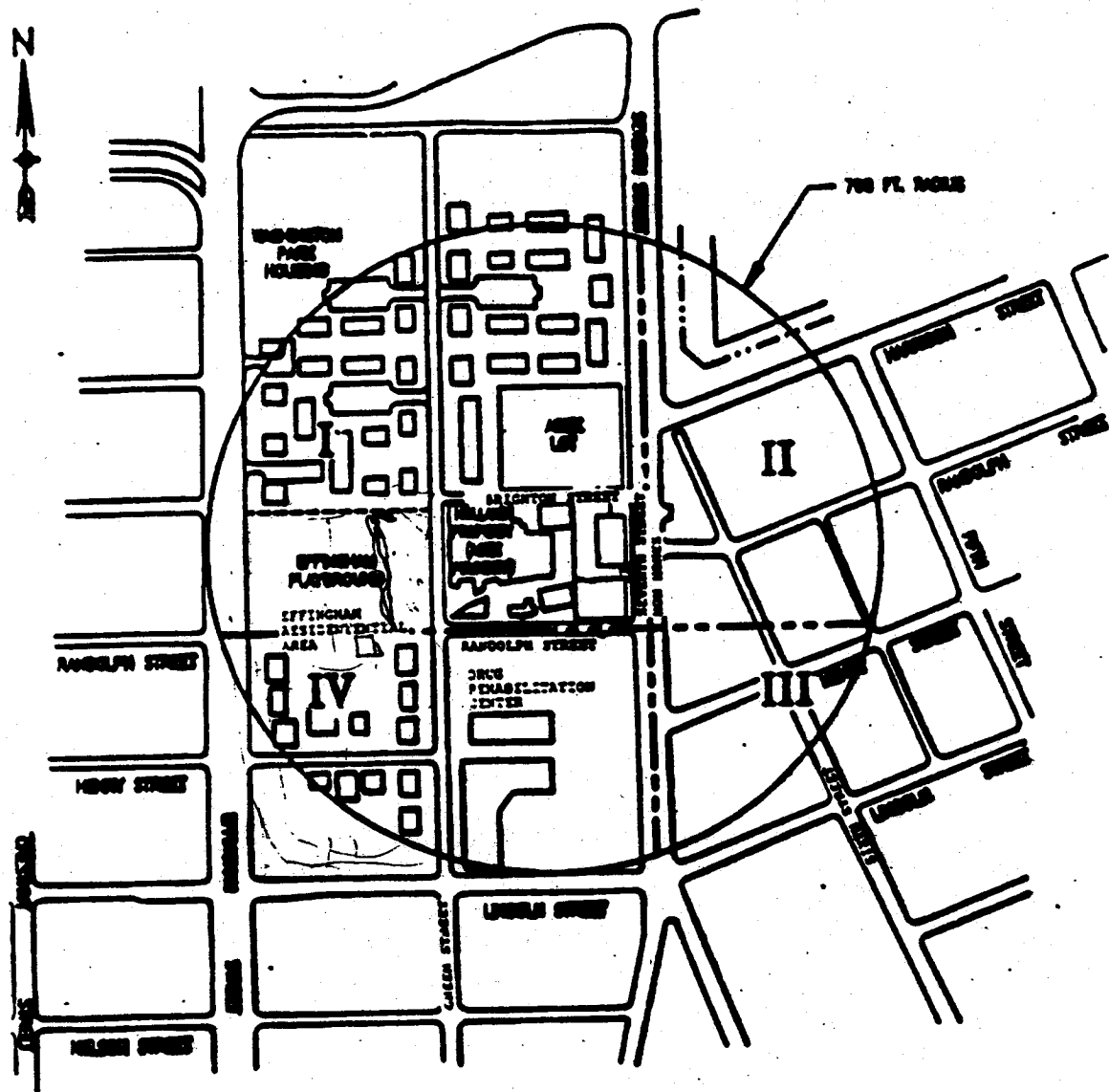
**SOURCE: USGS 7.5 MINUTE QUADRANGLE
FOR NORFOLK SOUTH, VIRGINIA,
DATED 1965, AND PHOTOREVISED
1996.**

1000 0 1000 2000 3000



SCALE IN FEET

FIGURE 2 - MAP OF SITE FEATURES



LEGEND
III CHURCH (1-1)
 - - - - - CHURCH SQUARES

100 0 100 200 400
 SCALE: 1" = 300'

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A brass and bronze foundry was operated at the Site from 1928 to 1978. The foundry melted used railroad car journal bearings which were over 80% bronze and poured the molten material into sand molds to cast new railroad car bearings. These sand casts eventually became laden with heavy metals, such as lead, antimony, copper, tin, and zinc. During operation, the foundry also produced stack emissions of fine particulate material associated with facility processes.

The National Bearing Metal Corporation purchased the foundry property in May of 1927 and operated the foundry at the Site from 1928 until December of 1944. American Brake Shoe Company bought the foundry in December of 1944 and operated it until May of 1966. At that time, Abex purchased the facility and operated the foundry until it closed in 1978. During Abex's operation of the foundry, waste sand was disposed of in an approximately one-acre area immediately north of the foundry building. When the foundry operation closed, Abex graded this disposal area (which is referred to as the Abex Lot) and secured it with a seven foot cyclone fence. Pneumo Abex Corporation, the successor of Abex Corporation, still owns most of the Abex Lot. In 1977, Runnymede Corporation, a real estate investment company, purchased a small parcel of the Abex Lot from Abex. Runnymede still owns this parcel, but no further development has occurred on it.

In 1984, Holland Investment and Manufacturing Corporation (hereinafter Holland Investment) purchased the portion of the Site that contains the foundry building and several smaller associated structures. Holland Investment allowed John C. Holland Enterprises, Inc., a trash hauling business, to conduct vehicle service and maintenance on the property.

During operation and following closure of the foundry, many of the parcels located nearby changed ownership and were redeveloped for other uses. These areas include the Washington Park development, the drug rehabilitation center, the Effingham Playground, and numerous private residences.

In January of 1983, an EPA contractor visited the Site to observe the conditions at the Abex Lot. No sampling was conducted during this preliminary assessment. EPA contractors returned to the Site in June of 1984 to perform a site inspection and collect several samples from the Abex Lot. Sample results detected high levels of lead (up to 10,400 mg/kg), zinc, copper, tin, and antimony. A sample which was to serve as an indication of the background concentration of lead in the soil, was collected east of the Site and also had a lead concentration of 2,750 mg/kg.

In April of 1986, EPA collected additional soil samples from the Washington Park development and other properties adjoining the Abex Site. The analytical results found lead concentrations of up to 12,800 mg/kg in the samples collected. Pursuant to the authority granted in Section 106 of CERCLA, 42 U.S.C. 9606, EPA entered into a Consent Order with Abex in August of 1986 for the excavation and removal of contaminated soil at varying depths (generally 6 to 12 inches) from certain residential areas around the Abex Lot. The areas to be addressed included portions of the Washington Park development, the Effingham Playground, and the Seventh Street row homes. All excavated areas were filled with clean soil and revegetated. Abex also paved and fenced the Abex Lot and the McCready Lot.

The analytical data collected at the Site were used to evaluate the relative hazards posed by the Abex Site using EPA's Hazards Ranking System (HRS). EPA uses the HRS to calculate a score for hazardous waste sites based upon the presence of potential and observed hazards. If the final HRS score exceeds 28.5, the site is placed on the National Priorities List (NPL), making it eligible to receive Superfund monies for remedial cleanup. An HRS score of 36.53 was calculated for the Abex Site. As a result, EPA proposed the Abex Site for inclusion on the NPL, on June 24, 1988 (53 FR 23988). The Site was placed on the list on August 28, 1990 (55 FR 35502).

On June 2, 1989, pursuant to Section 122 of CERCLA, 42 U.S.C. § 9622, EPA issued special notice letters to Abex Corporation and the Holland Investment offering them the opportunity to perform the Remedial Investigation/Feasibility Study (RI/FS) for the Site. On October 10, 1989, the Virginia Department of Environmental Quality (VDEQ), serving as the lead agency, entered into an Administrative Order on Consent with Abex pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606. Under the Order, Abex agreed to conduct the RI/FS at the Site to determine the nature and extent of Site contamination and to identify remedial alternatives for Site-related contamination of concern.

Based on the findings of the draft RI/FS report submitted in October of 1991 and the final RI/FS report dated February of 1992, EPA determined that lead-contaminated surface soil exceeding 500 mg/kg within the Effingham residential area, and at a few additional locations in the Washington Park development and the Effingham Playground, presented a short-term threat to human health. As a result, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, EPA issued a unilateral administrative order on March 30, 1992 to Abex requiring Abex to remove such soil from the Site. Abex agreed to perform the removal action and, to date, has excavated and removed additional contaminated surface soil in the Washington Park development and the Effingham Playground. Plans to remove soil in the Effingham residential

area have been temporarily suspended because the impacted residents chose to wait for the long-term remedial response action.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

EPA has several public participation requirements that are defined in Sections 113(k)(2)(B), 117, and 121(f)(1)(G) of CERCLA, 42 U.S.C. § 9613(k)(2)(B), § 9617, and § 9621(f)(1)(G), respectively. The documents which EPA used to develop, evaluate, and select a remedial alternative for the Abex Site have been made available to the public in the Administrative Record maintained at the Portsmouth Public Library (Reference Section) and at the EPA, Region III, Philadelphia Office. The Administrative Record is required by Section 113(k)(1) of CERCLA, 42 U.S.C. § 9613(k)(1).

The Proposed Plan to Amend the September 1992 ROD for this Site was released to the public on February 14, 1994. The Proposed Plan was mailed to affected residents, the City of Portsmouth and other PRPs. The Proposed Plan described remedial alternatives being considered by EPA and identified EPA's preferred alternative at that time. The notice of the availability of the Proposed Plan and the Administrative Record was published in The Virginia-Pilot/Ledger-Star on February 17, 1994. This notice also invited the public to participate in public availability sessions and a public meeting during the comment period. Public availability sessions are small meetings that give individuals and small groups a chance to meet with EPA to voice their opinions about issues at the Site. The public availability sessions were held on February 23, 1994. EPA held a public meeting to formally discuss the Proposed Plan and to receive comments on February 24th. The public was encouraged to review the Proposed Plan and the Administrative Record files and to submit comments on the proposed remedial alternatives to EPA during the public comment period. The public comment period ran from February 8, 1994 through March 19, 1994, meeting the statutorily required 30-day period.

IV. RATIONALE FOR CHANGING REMEDY CHOSEN IN SEPTEMBER, 1992 ROD

On October 19, 1993, Abex submitted proposed changes to the ROD based on new information from the City of Portsmouth about proposed land-use plans and new institutional controls on future excavation. EPA conducted public availability sessions from November 8, 1993 to November 10, 1993 to solicit input from the affected residents regarding the Abex's proposed changes to the ROD. The private homeowners responded favorably to the proposal. Most of the Washington Park residents were generally supportive of the proposal as well; however, a small number of residents

stated their continued interest in being permanently relocated. Both the City and the PRHA have indicated their support of the Abex proposal. After thoroughly evaluating the proposal and considering the responses to the proposal received from the affected residents during the November 8, 1993 public availability sessions, EPA published the Proposed Plan to Amend the September, 1992 ROD with its revised preferred remedy.

V. SCOPE AND ROLE OF THIS RESPONSE ACTION

As with many Superfund sites, the problems at the Abex Corporation Site are complex. As a result, EPA has organized the work into two operable units (OUs). These OUs are:

- OU1: Contamination in the soil and waste sands on the Holland Property, the Abex Lot, the McCreedy Lot and in the surrounding properties within an approximate 700-foot radius of the Abex foundry facility.
- OU2: Potential contamination of the shallow and deep aquifers, ecological impacts, including further investigation and analysis of surface and sediment quality, and additional soil contamination that may exist beyond the approximate 700-foot radius being addressed in OU1.

The subject of this ROD Amendment, OU1, is lead contamination in soil within the 700-foot study radius around the former Abex foundry. The primary exposure pathway of concern at this Site is incidental ingestion of contaminated soil. Based on results of EPA's Lead Uptake Biokinetic Model, children are exposed to an unacceptable health risk when the average lead concentrations in surface soil exceeds 400 mg/kg. The purpose of this response is to protect human health and the environment by preventing current or future exposure to the contaminated soil.

As part of OU2, additional RI/FS activities will be performed to fully characterize the nature and extent of groundwater contamination. The second operable unit will also include an investigation of additional soil contamination at distances greater than 700 feet from the foundry facility, as well as off-site ecological impacts.

VI. SUMMARY OF SITE CHARACTERISTICS

A. General Overview

The Abex Site is located in the urban environment of Portsmouth, Virginia, approximately one-half mile to the west of the south branch of the Elizabeth River. The Site is relatively

flat and is approximately five to ten feet above mean sea level. A review of aerial photographs from 1937 reveal extensive surficial drainage surrounding the Site. However, by 1964, drainage was largely confined to Gander Creek, a channelized canal flowing from east to west just north of the Abex Lot. At the present, most drainage occurs through a network of catch basins and storm sewers.

The Site is located in one of the oldest sections of the City of Portsmouth (hereinafter the City). The area was incorporated into the City's limits in 1784. The U.S. Naval Shipyard, located less than a mile to the southeast, commenced operation in 1767 and presently encompasses about 800 acres. The Portsmouth area experienced rapid growth during World War I and II when the Navy expanded its shipyard, hospitals, and docking facilities.

The population in the one-mile radius surrounding the Site varied during the period when the foundry was operating. From 1930 to 1950, the population in this area grew from 27,470 to 30,930. Since 1950, the population has been declining. In 1960, the population declined to 27,575; in 1970 it decreased to 19,940; and in 1980 it went down to 15,117.

The Elizabeth River Basin, which surrounds Norfolk, Portsmouth, and Chesapeake, drains approximately 300 square miles. The river basin is heavily industrialized and receives wastewater discharges from U.S. Naval facilities, heavy industry, major municipal treatment facilities, urban runoff, and boating and docking facilities.

Annual rainfall in the Site area is between 45 and 50 inches. Wind direction for the Portsmouth and surrounding area is predominantly north-northeast and south-southwest.

In general, the former foundry property and the surrounding 700-foot radius study area are underlain by a veneer of undistinguished fill material, sand, and fine grained sediments. Groundwater movement beneath the study area is largely confined to the sand-dominated strata.

Portsmouth lies in the Coastal Plain physiographic province and, in general, is underlain by a thick sequence of unconsolidated sediments consisting primarily of sand, gravel, silt, clay and some shell material. These sediments thicken from west to east in a wedge-like form and are immediately underlain by igneous and metamorphic bedrock. The depositional history of the unconsolidated sediments is complex and has resulted in what is generally an alternating sequence of sand and fine grain sediment layers.

In the vicinity of Portsmouth, large-scale groundwater movement occurs only within confined aquifers. Except for the uppermost aquifer, the Columbia Group, each aquifer is separated from the underlying aquifer by a confining unit. Most of the groundwater used in the area for potable purposes, is withdrawn from the confined aquifers. At the present time, very little groundwater withdrawn from the unconfined Columbia Group Aquifer is utilized for potable purposes.

B. Summary of RI Findings

The primary focus of the OUI RI was to evaluate possible lead contamination in soil on and around the foundry property. In addition, the RI included a limited investigation of groundwater, surface water, and sediments potentially impacted by the Site.

Soil contamination was investigated by sampling and testing over 1,000 samples for lead content. Of these samples, over 550 were also analyzed for fourteen other metals. Soil samples were collected either using a hand auger or through soil borings. A total of 206 locations were sampled using the hand auger. Sample locations were established primarily through use of a 100-foot grid system over the 700-foot radius study area. At each location, a minimum of two samples were collected - one at the 0 to 0.5 foot depth and a second at the 1.5 to 2 foot depth. Additional samples were collected to a maximum depth of 3 to 3.5 feet where elevated lead concentrations were observed.

Soil borings ranging in depth from 11 to 26 feet were performed at 34 locations primarily in the Abex Lot and in and around the Holland Property. A minimum of five samples were collected at each location to characterize the stratigraphy of the water table aquifer. The number of samples analyzed varied depending on the location and the conditions encountered. Most analyses were for lead or for the primary pollutant list of fourteen metals.

Sweep samples for dust were also collected from the interior of the foundry building and from the attics of two Seventh Street row homes. A number of the dust and soil samples collected on the Holland Property and in the Abex Lot were analyzed for the complete list of priority pollutants.

The major finding of the RI was that both surface and subsurface soils are contaminated with lead in residential and non-residential areas. Soil ("floor dirt") and dust throughout the interior of the foundry building on the Holland Property was found to contain lead levels of up to 100,000 mg/kg. Outdoor soil on the Holland Property contains lead levels of up to 58,000 mg/kg within the top two feet. Waste sand beneath the asphalt cap on the Abex Lot has lead concentrations ranging up to 24,000

mg/kg. Lead levels of up to 4,750 mg/kg occur within the top two feet of soil under the asphalt within the McCready Lot.

Surrounding areas containing lead-contaminated soil associated with the Site include portions of the Washington Park development, the Effingham Playground, the Effingham residential area, the Seventh Street row homes, the drug rehabilitation center property, and vacant lots east of Seventh Street.

Lead levels of up to 46,500 mg/kg were detected in soil at depths of one to four feet in portions of the Washington Park Housing Project. Subsurface soil in the Effingham Playground contains lead levels of up to 5,000 mg/kg. Contaminated surface soil (generally 6 to 12 inches) in both Washington Park and the Effingham Playground were previously excavated and removed by Abex pursuant to a Consent Order signed with EPA in August, 1986. A few additional areas in the Washington Park development and the Effingham Playground were identified during the investigation as having surface soil contamination above 500 mg/kg. Soil in these areas was excavated and removed by Abex pursuant to a unilateral order issued by EPA in March of 1992.

Surface and subsurface soil within the Effingham residential areas have lead concentrations of up to 8,000 mg/kg. Additional sampling performed as part of the 1992 removal action detected elevated levels of lead ranging up to 3,739 mg/kg in crawl spaces beneath eleven of sixteen homes sampled in this area.

Soil in lots associated with the Seventh Street row homes contain lead at levels up to 7,000 mg/kg at 0 to 2 feet in depth. Surface soil contamination in the row home lots was previously addressed by Abex under the 1986 Consent Order. Attics of two Seventh Street homes contain dust with lead levels of up to 7,030 mg/kg.

Surface soil within the drug rehabilitation center property contains lead at levels of up to 9,300 mg/kg. Lead has also been detected in surface soil of the vacant lots east of Seventh Street at levels of up to 1,200 mg/kg, with subsurface soils containing lead of up to 6,000 mg/kg.

A limited hydrogeologic investigation was undertaken at the Site to assess the impact of contamination on the surficial aquifer. Four monitoring wells, three piezometers, and numerous soil borings were installed to gain an understanding of the materials and contaminant distribution in the upper aquifer. Two monitoring wells were located in the Abex Lot; one well was located in the McCready Lot; and one well was located immediately north of the Seventh Street row homes. The wells were drilled to approximately fourteen feet below ground surface; the piezometers (wells about 2" to 4" in diameter that are used to measure subsurface pressure and water levels) were drilled to fifteen

feet below surface. Ground water was encountered from three to six feet below surface across the Site.

Groundwater data from the Abex property indicates that lead has entered the surficial ground water in the source area either through migration or through past disposal practices. Elevated concentrations of lead were present in filtered samples collected in one of the monitoring wells in the Abex Lot (MW-1). Lead levels of 31 micrograms per liter (ug/l) and 24 ug/l were detected during two separate sampling events. EPA recommends a cleanup level of 15 ug/l for lead in groundwater. Filtered samples collected in the other three wells did not exhibit elevated concentrations of lead. The surficial aquifer and the deeper aquifer are not currently used for drinking water supplies in the area of the Site. Further investigation of contamination in the deeper aquifer and the hydraulic relationship between the surface and deeper aquifers will be undertaken as part of OU2.

Surface water and sediment samples were collected from four catch basins within the 700-foot study area. Elevated metal concentrations were observed in both surface water and sediment samples. The significance of the metal concentrations to the Abex Site is unclear. Further investigation and analysis of surface water and sediment quality at the Site, including potential ecological impacts, will be performed as part of OU2.

VII. SUMMARY OF SITE RISKS AND CLEANUP LEVELS

This Section summarizes relevant portions of the baseline risk assessment from the September, 1992 ROD. The following is an excerpt from the Summary of Site Risks Section in the September, 1992 ROD.

An assessment of the potential risks posed to human health and the environment was completed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The baseline risk assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by the remedial action. It identifies the risks that could exist if no action were taken at the Site. The baseline risk assessment for the Abex Site was completed in February of 1992 and is part of the Administrative Record.

In general, a baseline risk assessment is performed in four steps: (1) data collection and evaluation; (2) the exposure assessment; (3) the toxicity assessment and; (4) risk characterization. This portion of the amended ROD will summarize the findings during each of these steps of the baseline risks assessment for the Abex Site.

A. Identification of Contaminants of Concern

Lead is the principal contaminant of concern at this Site due to its known health effects and its widespread presence in surface and subsurface soil in the residential areas, as well as the foundry properties. Other contaminants present in residential areas in levels of concern, along with lead, include antimony, nickel, tin, copper, and zinc. These contaminants are all known to be present in waste sands from the foundry operation. Other contaminants present at levels of concern at the Holland Property, the Abex Lot, or the McCready Lot include cadmium, chromium, silver, polynuclear aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs).

The two media of primary concern at this Site are soil and groundwater. An overview of the extent of contamination in the soil at the Site is presented in Table 1. The data is presented for the three residential areas - the Washington Park development, the Effingham residential area, and the Seventh Street row homes; the Effingham Playground; the foundry properties, including the Holland Property, the Abex Lot, and the McCready Lot; and for the vacant lots. The number of samples collected (designated as 'n'), the mean (or average) concentrations, and the upper 97.5 percentile confidence limit concentrations are presented in Table 1 for both surface soil (0 - 12") and subsurface soil (> 12') data. The term "upper 97.5 percentile confidence limit" is a statistical term used in describing how well the data collected reflect actual conditions. There is a 97.5% probability (i.e., 39 times out of 40) that the actual mean concentration for the contaminant of concern listed is below the upper confidence limit value.

Since lead is relatively immobile in the environment, the OU1 groundwater investigation in the RI was limited to four wells in the surficial aquifer. Groundwater in the surficial aquifer was found to exceed the EPA's recommended cleanup level for lead in one well on the Abex Lot. The surficial aquifer and the deeper confined aquifer are not currently used as drinking water supplies. Further investigation of potential groundwater contamination will be performed as part of OU2 to assess potential future risks and the need for possible remediation. The discussion of Site risks presented below will focus on contamination in the soil media.

B. Human Health Exposure Assessment

The purpose of the exposure assessment in the baseline risk assessment is to determine exposure pathways that exist at a site and to quantify the exposure associated with each pathway. An exposure pathway exists if there are: (1) contaminants at a site at levels of concern; (2) individuals that may come in contact

TABLE 1 - EXTENT OF SOIL CONTAMINATION AT THE ABEX SITE

AREA: Contaminant	SURFACE SOIL			SUBSURFACE SOIL		
	n	MEAN (mg/kg)	97.5th % UCL (mg/kg)	n	MEAN (mg/kg)	97.5th % UCL (mg/kg)
Washington Park Housing Project:						
Lead	135	260	289	93	2,926	20,744
Antimony	6	7	10	77	22	138
Copper	6	311	565	77	2,079	14,698
Nickel	6	7	13	77	26	146
Tin	6	55	89	77	580	4,314
Zinc	6	315	560	77	1,979	12,607
Effingham Residential Area:						
Lead	48	1302	1,688	38	1,545	8,632
Antimony	25	8	10	15	14	54
Copper	25	546	736	15	411	1,541
Nickel	25	16	23	15	28	103
Tin	25	152	224	15	490	1,872
Zinc	25	896	1,175	15	1,482	4,503
Seventh Street Row Homes:						
Lead	0	---	---	29	974	8,834
Antimony	0	---	---	29	9	41
Copper	0	---	---	29	902	9,452
Nickel	0	---	---	29	14	90
Tin	0	---	---	29	200	1,962
Zinc	0	---	---	29	500	4,852
Effingham Playground:						
Lead	36	267	326	34	1,869	8,526
Antimony	5	6	6	32	12	53
Copper	5	407	1,200	32	803	4,279
Nickel	5	6	12	32	33	186

TABLE 1 - EXTENT OF SOIL CONTAMINATION AT THE ABEX SITE

AREA: Contaminant	SURFACE SOIL			SUBSURFACE SOIL		
	n	MEAN (mg/kg)	97.5th % UCL (mg/kg)	n	MEAN (mg/kg)	97.5th % UCL (mg/kg)
Hffingham Playground (Cont.):						
Tin	5	63	132	32	423	2,117
Zinc	5	381	754	32	1,503	6,836
Holland Property/Abex Lot/McCreedy Lot:						
Lead	41	33,000	46,800	46	8,937	44,954
Antimony	33	590	928	45	104	659
Cadmium	33	15	21	41	4	18
Chromium	33	185	256	44	12	38
Copper	33	54,000	90,400	45	15,055	87,866
Nickel	33	255	397	45	71	395
Silver	33	18	26	39	5	26
Tin	33	2,872	4,261	45	1,861	12,720
Zinc	33	8,400	11,800	45	3,290	14,658
Total PAHs	340	29	32	1	0.099	---
Total PCBs	14	5	12	3	13.5	45.4
Vacant Lots/Drug Rehabilitation Centers:						
Lead	86	609	848	101	849	7,345
Antimony	22	7	9	30	18	141
Copper	22	619	1072	30	852	5,803
Nickel	22	10	14	30	16	67
Tin	22	100	154	30	298	1,738
Zinc	22	549	743	30	962	5,286

KEY:

- n = the number of samples collected
- mean = the average concentration of the samples collected; units are milligram per kilogram
- 97.5% UCL = Upper Confidence Limit; the concentration at which there is a 97.5 % probability that the actual mean concentration is below

with those contaminants; and (3) mechanisms through which contamination can enter the body.

The potentially exposed populations in OU1 consist principally of residents (children and adults) within approximately 700 feet of the foundry who could be exposed to soil containing the contaminants of concern discussed above. The risk assessment also considered the potential exposure to adults working in the former foundry building, although the foundry is no longer in operation and, therefore, this type of exposure is not presently occurring.

Actions at Superfund sites are generally based on an estimate of the reasonable maximum exposure expected to occur under both the current and future land-use conditions. The reasonable maximum exposure is defined as the highest exposure that is reasonably expected to occur at a site. The risk assessment for the Abex Site was based on the assumption that current and future land-uses in the area are not expected to change significantly².

Current land-uses at the Site are a mixture of residential and commercial/industrial. The Washington Park development, the Effingham residential area, the Seventh Street row homes, and the Effingham Playground are currently zoned for residential use. The Abex Lot, Holland Property, and McCready Lot, the drug rehabilitation center, and the vacant lots are zoned for use as commercial/light-industrial purposes. The Washington Park development is expected to continue to operate as residential units. The City has proposed rezoning the Effingham Playground, the Effingham residential area (i.e., a three block area bounded by Green, Lincoln, and Effingham Streets) and the Seventh Street row home area to commercial/light-industrial, demolishing the homes, and then building a police headquarters building and parking lots at the Effingham Playground and Effingham residential area. The Holland Property, the Abex Lot, and the McCready Lot are expected to be used for commercial/industrial purposes in the future. Future use of the vacant lots east of Seventh Street has not been determined. Most of the vacant lot area is located outside of the 700-foot study area for OU1.

Routes of exposure considered in the risk assessment include: soil ingestion; dermal contact; food ingestion; dust inhalation; and inhalation of vapors. These pathways are described briefly below:

² The areas that the City plans to rezone from residential to commercial/light industrial will not significantly affect the results of the risk assessment for the Site.

Soil ingestion	Eating soil and dust, usually inadvertently and probably arising mostly from the soil being transferred from hand to mouth.
Dermal contact	Skin contact with soil and dust.
Food ingestion	Eating locally grown foods not thoroughly washed to remove contaminated soil.
Dust Inhalation	Breathing dust. No industrial dusts are currently being generated through active operations, nor are any expected to be generated in the future. Dust may come from disturbed contaminated soil in the area.
Inhalation of vapors	Breathing vapors from groundwater and soil. This route of exposure was found to be negligible.

To quantitatively evaluate the exposure associated with pathways identified at the Site, assumptions were made concerning the reasonable maximum exposure for an individual living in the impacted area. Table 2 presents the activity pattern for exposed residents and the assumptions made as part of the risk assessment. This table was designed to reflect potential exposure to the contaminants of concern in soil. Different activities were assigned reasonable average weekly times. All activities were assumed to take place for 350 days per year.

As part of the process of quantifying exposure, standard assumptions are made concerning factors such as the intake rate for soil ingestion, the ability of soil to adhere to skin, inhalation and consumption rates, the average lifetime, and maximum periods of exposure. Table 3 summarizes the exposure factors used in the risk assessment for the Abex Site.

The final consideration in quantifying exposure is the concentration of the contaminant of concern to be used in the calculation. The risk assessment for the Site used data from soil samples collected in the top six inches to calculate exposure concentrations. Surface soil data was used since residents are exposed to these soils at a much greater frequency than subsurface soil. The mean concentration and the upper 97.5% confidence limit were calculated for each contaminant of concern in each area of the Site, as presented in Table 1. The upper confidence limit values were used to quantify individual exposure.

TABLE 2 - ACTIVITY PATTERNS FOR EXPOSED RESIDENTS							
ACTIVITY	HOURS/WEEK (By Age Category)						
	0-1	1-4	4-7	7-11	11-15	15-18	18-70
At home indoors	130	130	131	102	102	102	131
At home outdoors	35	35	33	33	33	33	33
Foundry site	0	0	1	1	1	1	1
At school off-site				29	29	29	
Activities off-site	3	3	3	3	3	3	3

Source: Baseline Risk Assessment for the Abex Site, Table 3.7

C. Human Health Toxicity Assessment

The purpose of the toxicity assessment is to weigh available evidence regarding the potential for particular contaminants to cause adverse effects in an exposed individual. Where possible, the toxicity assessment provides an estimate of the relationship between the extent of exposure to the contaminant and the increased likelihood and/or severity of adverse effects. The first step in the process is to determine whether exposure to the contaminant can cause an increase in the incidence of either a cancer-related (carcinogenic) or non-cancer-related (non-carcinogenic) adverse health effect. EPA gathers evidence from a variety of sources regarding these health effects, including controlled epidemiologic investigations, clinical studies, and experimental animal studies.

The second step in the toxicity assessment is to quantitatively evaluate the health effects associated with the contaminant of concern on the exposed population. For contaminants that are known or suspected of causing cancer, Cancer Slope Factors (CSFs) have been developed by EPA's Carcinogenic Assessment Group in order to estimate the adverse health effect. Carcinogenic effects are measured as the additional risk of an individual contracting cancer as a result of exposure to potentially carcinogenic chemicals. CSFs are multiplied by the estimated exposure rates to provide an upper bound estimate of the excess lifetime cancer risk associated with that exposure. The term "upper bound" reflects the

TABLE 3 - EXPOSURE FACTORS

Exposure pathway	Age Categories (e)						
	0-1	1-4	4-7	7-11	11-15	15-18	18-70
Ingestion of soil and dust							
Intake rate mg/day	100	200	200	100	100	100	100
Exposure frequency days/year	350	350	350	350	350	350	350
Dermal absorption of soil							
Soil to skin adherence factor mg/cm ² (f)	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Total limb area m ² (g)	0.203	0.286	0.406	0.537	0.81	0.997	1.05
Inhalation of contaminants (c)							
Indoor intake rate m ³ /day	1.645	4.168	6.636	7.267	7.952	9.845	15
Total intake rate m ³ /day	2.194	5.558	8.848	9.689	10.603	13.126	20
Body weight kg (b)	9	13.2	19.7	29.9	46	59.4	70
Consumption of home grown produce (d)							
Homegrown vegetables g/day	0	9.175	9.175	15.263	18.350	18.350	22.938
Homegrown fruit g/day	0	1.660	1.660	2.762	3.320	3.320	4.151
Fraction of adult consumption	0	0.4	0.4	0.665	0.8	0.8	1
Exposure constants							
Years of Potential Exposure	1	3	3	4	4	3	52
Lifetime fraction (for cancer risks)	0.014	0.043	0.043	0.057	0.057	0.043	0.742
Concentration of particulates in the air g/m ³ (h)		5E-05					
Lifetime	70 years						
Maximum period of exposure	30 years						

Source: Baseline Risk Assessment for the Abex Site, Table 3.8

conservative estimate of the risks and makes underestimation of the actual cancer risk highly unlikely. Table 4 lists the CSFs for the chemicals treated in this risk assessment.

For contaminants that are not known to cause cancer, reference doses (RfDs) have been developed by EPA for quantifying the potential for adverse health effects from exposure. RfDs are estimates of lifetime daily exposure levels for humans, including sensitive individuals, who are likely to be without an appreciable risk of adverse effects during a lifetime. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated soil) can be compared to the RfD. Table 5 lists values of RfD (for chronic exposure) and RfD (for subchronic exposure), where they are available. The toxicity profiles discussing the possible effects of the contaminants of concern are included at the end of this section.

EPA does not currently recommend using the standard risk assessment methods described thus far for evaluating lead contamination. EPA recommends, and the Abex Site risk assessment used, the Uptake/Biokinetic (UBK) Model to assess the hazards associated with lead contamination at the Abex Site. The UBK Model estimates a range of blood lead levels for children that can result from the overall exposure to the variety of lead sources in the environment. The Model considers possible exposure from air, diet, drinking water, soil/dust, paint chips/dust, and maternal blood lead sources. Table 6 presents the standard assumptions used in the UBK model for the Abex risk assessment. Lead exposure was evaluated for children up to four years old, the group most sensitive to potential adverse health effects from lead.

D. Toxicity Profiles For Contaminants of Concern

Lead is a heavy metal that exists in one of three oxidation states, 0, +2, and +4. Primarily, lead is used in equipment where pliability and corrosion resistance are required, in solder, in paints and varnishes, in storage batteries, and in alloys. Occupational exposure to lead dust and fumes can occur during mining, refining, smelting, and welding. Children with pica (placing non-food items in the mouth), as well as children exhibiting normal hand-to-mouth activities, who are exposed to lead-contaminated paint chips, dust, or soil can experience elevated blood lead levels, sometimes at elevations significant enough to cause illness. Some of these effects, particularly changes in the levels of certain blood enzymes and in aspects of childrens' neurobehavioral development, may occur at low blood lead levels. The fetus may also be impacted by blood lead levels below 10 micrograms per deciliter (ug/dl). Lead has been classified as a Group B2 probable human carcinogen. Oral exposure to lead salts, primarily phosphates and acetates, has caused kidney tumors in laboratory animals.

TABLE 4 - CANCER SLOPE FACTORS

CHEMICAL	SLOPE FACTORS (mg/kg-day) ⁻¹ *		
	ORAL	INHALATION	DERMAL
Metals:			
Antimony	**	**	**
Cadmium	**	6.1	**
Chromium (VI)	**	41.0	**
Copper	**	**	**
Nickel	**	0.84	**
Silver	**	**	**
Tin	**	**	**
Zinc	**	**	**
PAHs:			
Acenaphthene	**	**	**
Anthracene	1.85	1.95	0.07
Benzo(a)-anthracene	0.84	0.88	0.03
Benzo(a)-pyrene	5.79	6.10	0.22
Benzo(b)-fluoranthene	0.81	0.85	0.03
Benzo(ghi)-perylene	0.13	0.13	**
Chrysene	0.03	0.03	**
Dibenzo(a,h)-anthracene	6.43	6.77	0.24
Fluoranthene	**	**	**
Fluorene	**	**	**
Indeno(1,2,3-c,d)pyrene	1.34	1.42	0.05
Naphthalene	**	**	**
Phenanthrene	**	**	**
Pyrene	0.47	0.49	0.02
PCBs:			
PCB-1248 & PCB-1254	7.70	**	2.91

* risk per milligram per kilogram per day

** Factors not available or not appropriate for these chemicals

Source: Baseline Risk Assessment for the Abex Site, Table 4.3

TABLE 3 - REFERENCE DOSES (RfDS)						
CHEMICAL	CHRONIC (mg/kg-d)*			SUBCHRONIC (mg/kg-d)*		
	Oral	Inhalation	Dermal	Oral	Inhalation	Dermal
Antimony	0.0004	**	0.004	0.0004	**	0.004
Cadmium	0.001	**	0.007	**	**	**
Chromium (VI)	0.005	5.7E-07	0.053	0.02	5.7E-06	0.212
Copper	0.037	**	2.226	0.037	**	2.226
Nickel	0.02	**	0.171	0.02	**	0.171
Silver	0.003	**	0.063	0.003	**	0.063
Tin	0.6	**	1.8	0.6	**	1.8
Zinc	0.2	**	6	0.2	**	6
Acenaphthene	0.06	**	1.6	0.6	**	16
Anthracene	0.3	**	8	3	**	80
Benzo(a)anthracene	**	**	**	**	**	**
Benzo(a)pyrene	**	**	**	**	**	**
Benzo(b)fluoranthene	**	**	**	**	**	**
Benzo(ghi)perylene	**	**	**	**	**	**
Chrysene	**	**	**	**	**	**
Dibenzo(a,h)anthracene	**	**	**	**	**	**
Fluoranthene	0.04	**	1.067	0.4	**	10.67
Fluorene	0.04	**	1.067	0.4	**	10.67
Indeno(1,2,3-c,d)pyrene	**	**	**	**	**	**
Naphthalene	0.004	**	0.1067	0.04	**	1.067
Phenanthrene	**	**	**	**	**	**
Pyrene	0.03	**	0.8	0.3	**	8
PCB-1248 & PCB-1254	**	**	**	**	**	**

* milligrams per kilograms per day

** RfDs not available or not appropriate for this chemical

Source: Baseline Risk Assessment for the Abex Site, Table 4.2

TABLE 6 - STANDARD ASSUMPTIONS FOR UBK MODEL

	<u>Parameters that vary with age</u>			
	0-1	1-2	2-3	3-4
Exposure from air				
Background concentration in air: $0.2 \mu\text{g}/\text{m}^3$				
Indoor air concentration (% of outdoors): 30%				
Time spent outdoors (hours/day):	1	2	3	4
Ventilation rate (m^3/hr):	2	3	5	5
Percent absorption in lung: 32%				
Exposure from diet				
Background dietary exposure to lead ($\mu\text{g}/\text{day}$):	5.88	5.92	6.79	6.57
Percent absorption in gastrointestinal tract : 50%				
Exposure from drinking water				
Lead concentration in drinking water: $4 \mu\text{g}/\text{l}$				
Daily ingestion rate of drinking water (l/day):	0.20	0.50	0.52	0.53
Percent absorption in gastrointestinal tract : 50%				
Exposure from soil/dust				
Rate of soil/dust exposure (mg/day): 100				
Percentage exposure to soil: 45%				
Percentage exposure to dust: 55%				
Percent absorption in gastrointestinal tract : 30%				
Exposure from paint chips				
Rate of exposure to lead in paint (mg/day): 0				

Source: Baseline Risk Assessment for the Abex Site, Table 4.4

Antimony is a soft metal insoluble in water and organic solvents. It is widely used in the production of alloys. Oral exposure to antimony has been shown to cause burning stomach pains, cholic, nausea and vomiting in human. Long-term occupational inhalation exposure is associated with heart disease in both human and laboratory animals. Decreased longevity and altered cholesterol levels have been observed in rats. Antimony has not been tested for carcinogenicity.

Cadmium is a bluish-white metal. Small amounts of cadmium are found in zinc, copper, and lead ores. Cadmium is insoluble in water but is soluble in acids. Cadmium dust includes dust of various cadmium compounds. Cadmium is used as a protective coating for iron, steel, and copper because it is resistant to corrosion. Cadmium alloys (copper, nickel) may be used as coatings for other materials, welding electrodes, solders, and in pigments and paints. Cadmium is used as an amalgam in dentistry. Various cadmium compounds are used as fungicides and insecticides. Exposure to cadmium can occur through inhalation and ingestion. Short and long-term inhalation exposure to cadmium dust or fumes is associated with swelling of the lung tissue, pain in the chest, difficulty in breathing and emphysema. Long-term ingestion of cadmium is associated with changes and damages to the kidneys in laboratory animals. The EPA has classified cadmium as a Group B1 probable human carcinogen. Cadmium may be associated with an increased risk of prostate and lung cancer in humans occupationally exposed to this contaminant.

Copper is a reddish-brown metal which occurs free or in ores. It is insoluble in water but soluble in acid. Metallic copper is used as a conductor of electricity and in all gauges of wire for circuitry, coil, high conductivity tubes. Copper is used in many important alloys, such as brass and bronze. Copper is also used in insecticides, fungicides, catalysts, analytical reagents and paints. Acute exposure to copper salts may cause eye and skin irritation. Acute industrial exposure to copper may occur during fumes generated during welding copper-containing metals. This type of exposure may cause upper respiratory tract and stomach irritation. Chronic exposure to copper rarely occurs except in individuals with Wilson's disease. This is a genetic condition where abnormal amounts of copper are absorbed and stored by the body. Chronic exposure to copper may result in anemia. Copper is not classifiable as to human carcinogenicity.

Chromium is a heavy metal that exists in either a trivalent or hexavalent oxidation state. Hexavalent chromium is soluble and mobile in ground water and surface water. Trivalent chromium is in the reduced form and is generally found absorbed to soil; and therefore, it is less mobile. Hexavalent chromium is used in chrome plating, copper photography, copper stripping, aluminum anodizing, as a catalyst, in organic synthesis and photography. Exposure to chromium compounds can occur through ingestion,

inhalation and skin contact. Hexavalent chromium may have a direct corrosive effect on the skin and may cause upper respiratory distress, headache, fever, and loss of weight. Long-term occupational inhalation exposure to dust and fumes of hexavalent chromium has been shown to cause lung cancer in humans, especially those in the chromate-producing industry. In addition, a number of salts of hexavalent chromium are carcinogenic in rats. The EPA has classified hexavalent chromium as a Group A human carcinogen. Trivalent chromium is an essential nutrient and have low toxicity; however, at high levels, it may cause skin irritation.

Nickel is a white hard, ferromagnetic metal that is a naturally-occurring element in the earth's crust and is stable in the atmosphere at ambient temperatures. Nickel forms alloys with a variety of metals, including copper, manganese, zinc, chromium and iron. Elemental nickel is used in electroplating and casting operations, magnetic tapes, surgical and dental instruments, nickel-cadmium batteries, and colored ceramics. Occupational exposure to nickel compounds has been associated with an increased incidence of nasal cavity and lung cancers. For this reason, nickel refinery dust has been classified by the EPA as a Group A - Human Carcinogen via the inhalation route of exposure. The most common reaction to nickel exposure is skin sensitization. Nickel and its compounds also irritate the conjunctiva of the eye and the mucous membranes of the upper respiratory tract.

Polychlorinated biphenyls (PCBs) are complex mixtures of the products of the chlorination of biphenyl. The mixtures contain isomers of chlorobiphenyls with different chlorine content. PCBs may contain other chlorinated mixtures (e.g., chlorinated naphthalenes and chlorinated dibenzofurans). PCBs are stable and nonflammable. They are used chiefly in insulation for electric cables and wires. PCBs are persistent in the environment and bioaccumulate in food chains, with possible adverse effects on animals and man. Prolonged skin contact may cause the formation of chloracne which is characterized by blackheads, fat containing cyst and pustules. Irritation of eyes, nose and throat may also occur. Systemic toxic effects are dependent upon the degree of chlorination of the biphenyls. Short and long-term exposure may cause liver damage. PCBs may cause embryo toxicity leading to stillbirth. Some PCBs are carcinogenic in animals. The EPA has classified PCBs as Group B2 probable human carcinogens. Oral exposure to PCBs has been shown to cause liver tumors in laboratory animals.

Polycyclic aromatic hydrocarbons (PAHs) constitute a class of contaminants consisting of substituted and unsubstituted polycyclic aromatic rings formed by the incomplete combustion of organic materials. Their physical, chemical, and biological properties vary with their size and shape. PAHs are persistent

in the environment. Benzo (a) pyrene is one of the most common and most hazardous PAHs. Some PAHs are classified by the EPA as a Group B2 probable human carcinogens. Benzo (a) pyrene is the most potent of the carcinogenic PAHs. Oral exposure to benzo (a) pyrene has been shown to produce stomach tumors in mice and rats and mammary tumors in rats. Dermal exposure to benzo (a) pyrene has been shown to produce skin cancer in mice, rats and rabbits. Oral and inhalation exposure to benzo (a) pyrene has been shown to cause lung tumors in mice and rats. Long-term exposure to PAHs may cause birth defects.

Silver is a white metal insoluble in water and soluble in sulfuric and nitric acids. Alloys of silver (e.g., copper, aluminum, cadmium, lead or antimony) are used in the manufacture of silverware, jewelry, coins, films, mirrors, as a bactericide for sterilizing water, fruit juices, etc. Some silver compounds are also of medical importance as antiseptics or astringents. Exposure to silver can occur through inhalation of fumes or dust, ingestion of solutions or dust, or through eye and skin contact. Eye and skin contact with metallic silver may produce local permanent discoloration of the skin similar to tattooing. This process is referred to as argyria. Argyria is characterized by a dark, slate-gray color pigmentation of the skin. Generalized argyria can develop through exposure to silver oxides or salts through ingestion and inhalation of dust. Silver is not classifiable as to carcinogenicity.

Tin is a soft, silvery white metal insoluble in water. It is used as a protective coating for other metals such as in household utensils, as soft solders, and in the packaging industry. Exposure to tin may occur in mining, smelting, and refining, and in the production and use of tin alloys and solders. Inorganic tin salts are mild skin irritants. Exposure to dust or fumes of inorganic tin is known to cause lung disease. Tin is not classifiable as to human carcinogenicity.

Zinc is a bluish-white metal that is stable in dry air, but becomes covered with a white coating on exposure to moist air. Zinc is present in abundance in the earth's crust. Zinc chloride is used as a wood preservative, in dry battery cells, in oil refining operations, and in the manufacture of dyes, activated carbon, deodorants and disinfecting solutions. Zinc chromate and zinc oxide are used primarily as pigments. Exposure to zinc compounds can cause skin sensitization, irritation of the nose and throat, fever, and fatigue. Zinc is not classifiable as to human carcinogenicity.

E. Human Health Risk Characterization

The risk characterization section in a risk assessment summarizes the results of the exposure and toxicity assessments to describe the baseline risk for the Site. In general, risk is

characterized as being unacceptable when: (1) existing levels of contaminants present at a site may cause cancer or some other adverse health effect; (2) there is a route or pathway through which a receptor may be exposed (e.g., ingestion of contaminated soil) and; (3) there is a receptor which may be exposed (e.g., a child ingesting soil). For cancer-causing contaminants, risk is measured as the number of additional incidences of cancer that can be expected in a population exposed to that contaminant. For example, one additional incident of cancer estimated to occur in a population of 10,000, as a result of exposure to contamination at a site, would quantitatively be described as a 1×10^{-4} cancer risk. EPA recommends that remedial actions be taken to address risk greater than a 1×10^{-4} cancer risk. EPA may recommend action in situations where the risk is in the range of 1×10^{-4} to 1×10^{-6} (one additional incident of cancer in a population of 1,000,000).

For non-carcinogenic contaminants, risk is considered unacceptable when the concentration of the contaminant that an individual is exposed to (i.e., the intake rate) exceeds the RfD concentration for that contaminant. The non-carcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ). To assess the overall potential for non-carcinogenic effects posed by more than one contaminant, the HQs are added to determine the Hazard Index (HI). The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposure within a single medium or across media. EPA may recommend action in situations where the HI exceeds one.

Table 7 summarizes the quantitative results of the risk assessment for residents and workers exposed to contaminants of concern other than lead at the Site. In the case of residential exposure, risks to different age groups were determined.

EPA does not recommend characterizing the health effects associated with lead using the risk assessment procedures discussed above. EPA currently believes that the best available approach for characterizing risks associated with lead in residential areas is the UBK Model. The UBK Model was used at the Abex Site to predict the percentage of highly exposed children that would have a level of lead in their blood exceeding 10 ug/dL, the level recommended as safe by the Center for Disease Control (CDC), at various levels of contamination. Based on the exposure assumptions presented earlier, the Model predicts that approximately 95% of children exposed to soil/dust with an average lead concentration of 400 mg/kg would have blood lead levels below 10 ug/dL. This is the average lead concentration that should be achieved at the Site by implementation of the remedy.

TABLE 7 - BASELINE RISKS FOR THE ABEX SITE		
EXPOSED POPULATION	HAZARD INDEX	CANCER RISK
Residents: (by age group)		
0-1	0.83	1.20×10^{-6}
1-4	1.21	1.29×10^{-6}
4-7	1.35	3.34×10^{-6}
7-11	0.70	2.36×10^{-6}
11-15	0.57	1.59×10^{-6}
15-18	0.50	1.35×10^{-6}
18-70	0.51	2.09×10^{-5}
Total lifetime risk: (for carcinogens)	----	3.0×10^{-5}
Future Workers: (chronic/subchronic)		
Inhalation	43.9/43.8	4.10×10^{-4}
Ingestion	2.42/2.38	1.46×10^{-4}
Dermal	4.49/4.37	3.41×10^{-4}
Total lifetime risk: (for carcinogens)	-----	8.97×10^{-4}

At the time the baseline risk assessment was done, the baseline risk assessment determined that surface soil contamination at the Site presented a current unacceptable risk to residents and would pose unacceptable risks to workers within the former foundry building. The average lead concentration exceeded 400 mg/kg in surface soil in the Effingham residential area, on the Holland Property, and in the vacant lots. The Site would also pose an unacceptable future risk to residents as a result of potential exposure to contaminated subsurface soils. Average lead concentrations exceeded 400 mg/kg in subsurface soil in the Washington Park development, the Effingham residential area, the Seventh Street row homes, the Holland Property, the Abex Lot, the drug rehabilitation center, and the vacant lots. At the present, the foundry buildings are not in use, and have been secured to restrict access. One foundry building has been dismantled due to its poor structural condition. In addition,

CERCLA removal actions were performed in which lead-contaminated surface soil exceeding 500 mg/kg lead was excavated from the Washington Park Development, the Effingham Playground, and the Seventh Street Row Homes. The Effingham residents were informed of the human health risks posed by exposure to lead-contaminated surface soil on their property. They chose to wait for the long-term Site remediation to have both the lead-contaminated surface and subsurface soil excavation work done at the same time. The removal actions alleviated the current risks to Site residents (except for Effingham homeowners) being exposed to lead-contaminated surface soil, however, they did not eliminate the future risks posed by subsurface lead-contaminated soils. This remedy will address the future risk.

The baseline risk assessment also indicated that children between the ages of one and seven and future workers at the former foundry building could be exposed to unacceptable future risk associated with other non-carcinogenic contaminants of concern. This is indicated in Table 7 where the total HI values are greater than one. It should be noted, however, that the HI calculations may over estimate the potential for adverse health effects at the Site since not all contaminants of concern induce the same health effect by the same mechanism or action.

The total lifetime cancer risks associated with the areas addressed by OUI are 3.0×10^{-5} for residents (i.e., one additional incident of cancer in an exposed population of 33,333) and 8.97×10^{-4} for future workers at the former foundry facility (i.e., one additional incident of cancer in an exposed population of 1,115). As noted earlier, EPA recommends that remedial actions be taken to address risk greater than a 1×10^{-4} cancer risk. EPA may recommend action in situations where the risk is in the range of 1×10^{-4} to 1×10^{-6} (one additional incident of cancer in a population of 1,000,000).

F. Future Risks Associated With Subsurface Soil

Because contaminated soil has been removed and/or necessary precautions are being taken by residents to limit exposure, residents are not currently being exposed to unacceptable health risks. The potential for future exposure to unacceptable human health risks may exist if contaminated subsurface soil is brought to the surface by future activity. The risk assessment only briefly discusses this subject in conjunction with current and future land-use and states that highly contaminated subsurface soils could be brought to the surface if large scale development occurs.

In addition to large scale development, EPA has considered other possible mechanisms for exposure to subsurface soils either directly or by the transport of these soils to the surface. Routine activities by property owners or their children include,

but are not limited to, gardening of fruits, vegetables and other plants, children playing in soil (e.g., digging holes, making mud pies, etc.), and installing fence posts, decks, and playground equipment. Construction activities that could result in human exposure to contaminated subsurface soil and the recontamination of surface soil include, but are not limited to, construction of housing additions, maintenance and addition/replacement of subsurface utilities, demolition of existing buildings/structures, construction of new buildings/structures, and construction of in-ground pools.

EPA is unaware of any research or models that can be used as a basis for estimating the potential future exposure of residents to subsurface soil contamination. Since future activities in the residential areas of OU1, unless restricted, could reasonably result in either direct exposure to contaminated subsurface soil or exposure to contaminated soil reintroduced to the surface, EPA believes surface and subsurface soil are of equal concern. Since this ROD Amendment identifies the final remedial action for contaminated soil in OU1, EPA believes a conservative approach to determining the extent of cleanup is appropriate.

G. Ecological Risk

The OU1 RI focused on the area within a 700-foot radius of the foundry, which is a predominantly urban area. A formal ecological risk assessment that qualitatively and/or quantitatively appraises the actual or potential effects of the Site on plants and animals was not performed as part of this OU. An investigation of the ecological impacts that may be associated with this Site, particularly with regard to the Elizabeth River and off-site environmental receptors, will be evaluated in OU2.

H. Lead Cleanup Levels

After completion of the baseline risk assessment at a site, appropriate cleanup levels are considered during the Feasibility Study in order to evaluate the effectiveness of the remedial alternatives. For sites dealing with lead contamination, EPA recommends, as a matter of policy (OSWER Directive #9355.4-02), that soil cleanup levels in the range of 500 to 1,000 mg/kg lead be used to trigger a remedial action in residential areas. The use of specific clean-up levels has proved to be an effective method for implementing cleanup activities. After cleanup has been completed, confirmatory sampling is performed to ensure that unacceptable risks identified in the baseline risk assessment have been addressed. Since other contaminants of concern identified at the Abex Site are found in close association with lead, actions taken to achieve the lead cleanup levels will also be effective in addressing unacceptable risks from these contaminants.

VIII. DESCRIPTION OF ALTERNATIVES

The remedial alternative selected in the September, 1992 ROD (Alternative 4) and the alternative now preferred by EPA (Alternative 8), are described below.

A. Elements Common to Alternatives 4 & 8:

Both Alternatives 4 and 8 include the following elements:

1. Demolition of Former Foundry Facility Buildings on Holland Property

All buildings associated with the former foundry operation will be demolished. Demolition debris will be tested using TCLP to determine if the material is RCRA hazardous waste. If the demolition debris exhibits toxicity, it will be disposed of off-site in a RCRA Subtitle C landfill, after RCRA land disposal restriction requirements are met. If the construction debris does not exhibit toxicity, it will be disposed of off-site in a permitted RCRA Subtitle D landfill.

Equipment which is contaminated with or constitutes a RCRA hazardous waste will be disposed of off-site in accordance with the requirements of RCRA Subtitle C, including the LDR requirement. Equipment which is not contaminated with or is not a RCRA hazardous waste, or which is decontaminated so that it no longer is contaminated with or constitutes a RCRA hazardous waste, may be used or disposed of off-site in a manner not inconsistent with applicable laws or regulations. Residuals generated as a result of decontamination activities will be tested under TCLP and disposed of as required by RCRA Subtitle C and any other laws or regulations which may be applicable to such waste.

2. Soil Excavation and Off-Site Disposal

Soil excavation and off-site soil disposal is required to various extents under both Alternatives. TCLP testing will be conducted to determine whether excavated soil is a RCRA characteristic hazardous waste. Soil which is determined to be a RCRA hazardous waste will be treated prior to land disposal. Soil which is not a RCRA hazardous waste will be treated to the extent and in the manner as may be required by the state to which such soils will be transported for off-site disposal. Conventional earth-moving equipment will be used to excavate and load the contaminated soil. Dust suppression measures will be used to ensure that unacceptable releases of air-borne contamination do not occur. All excavated areas will be backfilled with clean fill. Formerly vegetated areas will be graded and reestablished to original condition, to the extent

practicable. Where excavation to the depth of the water table is required, excavation will occur during the period when the water table is at the seasonally low elevation, to the extent practicable.

Prior to the excavation of contaminated soil on the Abex Lot, the McCready Lot, and the Holland Property, existing asphalt and concrete will be removed and tested using the TCLP. Debris which is determined not to be RCRA hazardous waste, will be disposed of as construction and demolition debris. Debris that tests as hazardous under TCLP will be disposed of in accordance with RCRA Subtitle C requirements, including LDR regulations.

Excavated soil and waste materials will be temporarily staged on-site prior to treatment and/or transportation to an off-site disposal facility; to the extent practicable, excavated soil and waste material will be staged in areas of existing contamination, e.g., the Abex Lot, the Holland Property, McCready Lot, or the vacant lots; containment measures such as berms and temporary covers will be used in areas with staged material to ensure that there are no unacceptable air or water-borne releases of contamination from these areas; these measures will be sufficient to provide protection in the event of flooding; areas that are used to stage excavated material will be secured with a fence to prevent trespassing. In all instances where soil and waste materials are staged in areas where cleanup has previously occurred or are otherwise not contaminated above levels requiring excavation, soil and waste material will be staged in containers in accordance with RCRA regulations contained in 40 C.F.R. Part 268.50; containers used will be in compliance with VHWMR § 10.8 Use and Management of containers.

3. Temporary Relocation

Residents will be temporarily relocated while excavation is occurring around residential units. The extent of soil to be removed around each residential unit will be determined during the remedial design phase. The specific arrangements for temporary housing will be based on the extent of soil to be removed and the needs of the impacted residents. Efforts will be made to minimize inconvenience to the residents.

4. Soil Treatment By Stabilization and/or Solidification

Excavated soil and waste materials from the Site that exhibit toxicity (as determined by the TCLP test) will be treated on-site via stabilization by mixing such soil and waste materials with chemicals/reagents. The mixing will be contained in above-ground equipment on-site to create a final product that encapsulates and immobilizes lead and other metals. Specific chemicals to be used in the process will be determined in a treatability study during the remedial design phase of the

project. Treated material will be tested using TCLP to ensure it no longer exhibits toxic characteristics. Further treatment will be undertaken if the soil and waste material still exhibit toxicity. If the soil or waste material still exhibits toxicity after further treatment, it will be disposed of in a permitted RCRA Subtitle C landfill, after meeting RCRA LDR requirements. Soil and waste materials that no longer exhibit toxicity after treatment will be disposed of off-site in a permitted RCRA Subtitle D landfill.

5. Discharge of Contaminated Water

Discharge of decontamination water and any other water generated during remedial activities will meet Virginia Pollution Discharge Elimination System (VPDES) requirements developed pursuant to the Federal Clean Water Act, 31 U.S.C. §§ 1251 et seq., and the Virginia State Water Control Law, Code of Virginia §§ 62.1-44.2 et seq. It is anticipated that most of the water generated by the Site activities will be recycled or re-used in the treatment process. The water that is not recycled will be treated, tested and sent off-site either to a waste water treatment facility (if the water does not exceed the levels of lead that the treatment facility is permitted to accept) or treated on-site and discharged into the Elizabeth River. If the water is to be discharged into the Elizabeth River, it will have to meet all VPDES requirements.

6. Air Emissions Monitoring During Remedial Activities

Air will be monitored for both dust and lead levels during the remedial activities to protect the health of on-site workers and the community. Sampling of the interior of homes in the vicinity of excavation will also be performed before, during, and after excavation to assure that the National Emission Standards for Hazardous Air Pollutants (NESHAPs) developed under the Federal Clean Air Act, 40 C.F.R. §§ 50.12 and 50.6, and the Virginia Regulations for the Control and Abatement of Air Pollution (VRCAAP), VR § 0401-0101, are not exceeded.

7. Transportation, Storage, Treatment and Disposal of Soil and Debris

Transportation, storage, treatment and disposal of soil and debris will be in compliance with applicable provisions of RCRA, the federal regulations promulgated thereunder pursuant to HSWA at 40 C.F.R. Parts 260-271, the Virginia Hazardous Waste Management Regulations (VHWMR) or Virginia Solid Waste Management Regulations.

B. Elements Specific to Alternative 4 or 8:

A description of additional elements and the estimated cost for each Alternative is provided below.

1. Alternative 4:

Estimated Capital Cost:	\$31,962,923 ³ /
Estimated O & M Cost:	0
Estimated Present Worth:	\$31,962,923
Estimated Time to Construct:	55 weeks

In areas zoned for residential use, surface and subsurface soil located between the ground surface and the water table which contains greater than 500 mg/kg lead, including contaminated soil adjacent to home foundations, would be excavated. Geotechnical investigations would be performed during remedial design to determine if remediation beneath homes would be technically practicable and, if so, to determine the appropriate construction techniques to be used to maintain the structural integrity of the homes during such excavation.

In areas zoned for commercial/industrial use, surface soil (0-12" in depth) exceeding 500 mg/kg lead and subsurface soil (>12" in depth) exceeding 1,000 mg/kg lead would be excavated to the depth of the water table.

2. Alternative 8:

Estimated Capital Cost:	\$31,484,170 ⁴
Estimated O & M Cost:	\$23,500
Estimated Present Worth:	\$31,507,670
Estimated Time to Construct:	58 weeks

³ In preparing the cost estimate for Alternative 8, EPA determined that the cost of excavation, treatment, and disposal of contaminated soil on the Holland Property had inadvertently been omitted from Alternative 4. This cost has been included in Alternative 8 and has also been added to Alternative 4 so that an appropriate comparison can be made.

⁴ For cost estimate purposes, EPA has assumed that the areas where the Effingham and Seventh Street homes currently exist will be rezoned by the City of Portsmouth to commercial/light industrial use. The estimated cost to demolish the Effingham and Seventh Street homes and dispose of debris in a RCRA permitted landfill has been included. If these residential areas are not rezoned, these areas must be remediated in the manner specified in this ROD Amendment for areas zoned residential.

In areas zoned for residential use at the completion of the preliminary remedial design, and in the Abex Lot, surface and subsurface soil located between the ground surface and the water table which contains greater than 500 mg/kg lead would be excavated.

If all necessary EPA-approved institutional controls⁵ are in effect by the completion of the preliminary remedial design, soil from the ground surface to a depth of one foot in commercial/industrial areas (except for the Abex Lot) which exceeds 500 mg/kg lead will be excavated. Soil below one foot which exceeds 1,000 mg/kg lead will be excavated to a depth of two feet. The institutional controls will prevent excavation activities that could allow human exposure of lead-contaminated subsurface soils. If the institutional controls are not in place by the completion of the preliminary remedial design, soil which exceeds 1,000 mg/kg lead will be excavated down to the water table.

Institutional land-use controls will be implemented to control any future excavation below two feet and to prevent exposure to contaminated soil. EPA will review, comment upon, and approve all institutional controls to be implemented as part of the remedial action for the Site. These institutional controls may include: an ordinance or regulation requiring a permit for, and imposing restrictions on, excavation in areas within OU1 and requiring notice to EPA, the City, PRHA, and the public prior to excavation in such areas; the inclusion of provisions in deeds for properties within OU1 providing notice of this CERCLA remedy and restricting excavation on such properties; and the placement of underground "warning sheets" in excavated commercial/ industrial areas before backfilling with clean soil. The institutional controls must be sufficient to ensure (1) that soils below two feet are not disturbed in areas of OU1 or commercial/industrial after completion of this remedy with prior notice to EPA, the City, PRHA, and the public, and (2) if such soils are to be disturbed, the soils are managed in a manner which will not endanger public health or the environment.

Soil beneath existing permanent covers such as buildings without crawl spaces, parking lots, sidewalks, and streets would

⁵ The PRP proposal of October, 1993 described several potential institutional land-use controls to be employed to prevent exposure to contaminated subsurface soils remaining on-site. EPA will review comment, and approve all institutional controls to be implemented as part of the remedial action for the Site.

not be removed⁶. These covers would be maintained and EPA-approved institutional land-use controls would be used to prevent future exposure to contaminated soil beneath such covers.

A five-year review pursuant to CERCLA § 121(c), 42 U.S.C. § 9621(c), will be required under this Alternative.

IX. COMPARISON OF ALTERNATIVES

The Alternatives described above were evaluated in the Proposed Plan to Amend the September, 1992 ROD using the following criteria, as required under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. § 300.430(e)(9)(iii):

A. General Overview of Evaluating Criteria:

1. **Threshold Criteria:** (Relate to statutory requirements that each alternative must satisfy in order to be eligible for selection.)

Overall Protection of Human Health and the Environment:

Evaluation of the ability of each alternative to provide adequate protection of human health and the environment in the long and short-term; description of how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARS)

Evaluation of the ability of each alternative to meet all ARARS of Federal and State environmental laws and/or justification for invoking a waiver; assessment of the ability of each alternative to comply with advisories, criteria, and guidance that EPA has agreed to follow.

⁶ The former foundry buildings, the Effingham and Seventh Street homes, and the asphalt covers on the Abex Lot, the McCready Lot and the Holland property would all be removed under this Alternative and contaminated soil beneath these existing permanent covers would be removed to the health-based levels specified in this ROD Amendment for the area or zoning classification at issue. The definition of "permanent cover" does not include buildings that have crawl spaces with dirt floors.

2. Primary Balancing Criteria: (Technical criteria upon which the detailed analysis is primarily based)

Long-Term Effectiveness and Permanence

Evaluation of expected residual risk and the ability of each remedy to maintain reliable protection of human health and the environment over time after cleanup goals have been met.

Reduction of Toxicity, Mobility or Volume Through Treatment

Evaluation of the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances.

Short-Term Effectiveness

Evaluation of the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

Implementability

Evaluation of the technical and administrative feasibility of each alternative, including the availability of materials and services.

Cost

Section 121 of CERCLA, 42 U.S.C. Section 9621, requires selection of a cost-effective remedy that protects human health and the environment and meets the other requirements of the statute. The Alternatives are compared with respect to present worth cost, which includes all capital costs and the operation and maintenance cost incurred over the life of the project. Capital costs include those expenditures necessary to implement a remedial action, including construction costs. All of the costs indicated below are estimates.

3. Modifying Criteria: (Criteria considered throughout the development of the preferred remedial alternative and formally assessed after the public comment period, which may modify the preferred alternative.)

State Acceptance

Assessment of technical and administrative issues and concerns that the State may have regarding each alternative.

Community Acceptance

Assessment of issues and concerns the public may have regarding each alternative based on a review of public comments received on the Administrative Record and the Proposed Plan.

B. EVALUATING CRITERIA APPLIED TO ALTERNATIVES 4 & 8:

Threshold Criteria:

1. Overall Protection of Human Health and the Environment

Alternative 4 would require removal of soil that exceeds residential or commercial/industrial health-based cleanup levels, as appropriate, to the depth of the water table and is considered fully protective of human health and the environment.

Alternative 8 will require removal of soil that exceeds the residential health-based cleanup level (500 mg/kg lead) to the depth of the water table in residential areas and the Abex Lot and to a depth of one foot in the remaining commercial/industrial areas. An additional one foot of soil (i.e., 12"-24" depth) will be removed in commercial/industrial areas where lead concentrations exceed 1,000 mg/kg. Exposure to contaminated soil remaining below the depth of two feet in commercial/industrial areas or below existing permanent covers such as buildings, parking lots, sidewalks, and street would be prevented through the use of institutional controls described in Section VIII.B. As noted previously, failure to implement the institutional controls by the completion of the preliminary remedial design will result in commercial/industrial areas having to be excavated to 500 mg/kg lead in the first foot and 1,000 mg/kg lead to the depth of the water table. If the Effingham residential area, the Effingham playground, and Seventh Street row homes are not rezoned by the completion of the preliminary remedial design, soil exceeding 500 mg/kg lead will be excavated in these areas to the depth of the water table and further investigation into appropriate remediation of soil beneath homes that have crawl spaces with dirt floors will have to be undertaken. Alternative 8 is also considered fully protective of human health and the environment.

2. Compliance with ARARs

Both Alternatives 4 and 8 would meet the following respective federal and state ARARs:

- The Resource Conservation and Recovery Act, (40 C.F.R. Parts 261-270); the Virginia Hazardous Waste Management Act (Code of Va. §§ 10.1-1400 et seq.); the Virginia Waste Management Regulations (VR §672-10-1); and the Virginia Solid Waste Management Regulations (VR §672-20-10). These provisions regulate the transportation, treatment, storage, and disposal of hazardous and solid wastes that are excavated or generated during the cleanup.
- Clean Water Act; National Pollution Discharge Elimination System requirements, (40 C.F.R. Part 122); the Virginia Water Control Law (Code of Va. § 62.1-44.2 et seq.); and the Virginia State Water Control Board regulations (VR §680-21-00). These regulate any discharge of wastewater generated during the cleanup to the waters of the Commonwealth of Virginia.
- National Primary and Secondary Ambient Air Quality Standards, for Lead (40 C.F.R. Part 50.12) and Particulate Matter (40 C.F.R. Part 50.6); and the Virginia Air Pollution Control Law (Code of Va. §10.1-1300 et seq.), and the Virginia regulations for the Control and Abatement of Air Pollution (VR § 120-01) regulate air emissions and establish permissible levels of lead and particulate matter that can be released into the environment during the cleanup activities.
- Executive Order 11988, Floodplain Management; the National Flood Insurance Act of 1968; the Flood Disaster Act of 1973; and Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Environmental Policy Act. These provisions regulate cleanup activities because they take place in a floodplain.
- Coastal Zone Management Act, 16 U.S.C. §§1451 et seq.; the Coastal Management Plan for the City of Portsmouth; and the National Oceanic and Atmospheric Administration (NOAA) Regulations on Federal Consistency With Approved State Coastal Zone Management Programs. These provisions regulate cleanup activities because they take place in a cleanup coastal area.
- Virginia's Chesapeake Bay Preservation Act (Code of Va. §10.1-2100 et seq.), and Chesapeake Bay Preservation Area Designation and Management Regulations (VR §173-02-01) regulate cleanup activities that take place in designated

resource management areas and/or resource protection areas as defined in the Chesapeake Bay Preservation Act.

- Virginia Erosion and Sediment Control Law (Code of Va. §10.1-560 et seq.) and the Virginia Erosion and Sediment Control Regulations (VR §625-02-00). These provisions require control measures during earth-moving activities to prevent erosion and transport of sediment in surface water runoff.
- 40 C.F.R. Part 50, Appendix G establishes protocols for air monitoring to be conducted during the cleanup.
- 40 C.F.R. Part 264, Subpart I, and VR §10.8 Use and Management of Containers regulate the use of containers for storing and/or treating hazardous wastes during the cleanup.
- 40 C.F.R. Part 264, Subpart J, and VR §10.9, Tanks regulate the use of tanks for storing and/or treating hazardous wastes during the cleanup.
- 40 C.F.R. Part 264, Subpart L, and VR §10.11, Waste Piles regulate the use of waste piles for storing and/or treating hazardous wastes during the cleanup.
- 40 C.F.R. Part 268, Subpart E, Prohibitions on Storage regulates the storage of hazardous waste restricted from land disposal.
- 40 C.F.R. Part 262 and 263, 49 C.F.R. Parts 171-179, and VR Part VII, and the Virginia Regulations Governing the Transportation of Hazardous Materials (VR § 672-30-1) regulate the transportation of hazardous wastes in the Commonwealth of Virginia and will be relevant and appropriate requirements for the on-site shipment preparation of Special Wastes to be transported off-site.
- Virginia Solid Waste Management Regulations, Part VIII, regulate disposal of "Special Wastes" generated during the cleanup in the Commonwealth of Virginia RCRA Subtitle D solid waste landfills.
- Occupational Safety and Health Administration Act (OSHA), 29 C.F.R. Parts 1910, 1926, and 1904, regulate health and safety requirements for workers during the cleanup.

Alternatives 4 and 8 would also both meet the following EPA guidance considered to be relevant to this cleanup:

- Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (EPA OSWER Directive 9355.4-02) recommends use of the UBK Model and appropriate assumptions to develop

soil cleanup levels for lead.

- Methods for Evaluating the Attainment of Cleanup Standards, Vol. I (EPA 230/02-89-042) recommends statistical methods to confirm cleanup levels have been achieved.

Balancing Criteria:

3. Long-Term Effectiveness and Permanence

Alternative 4 provides minimal residual risk and, therefore, a high degree of long-term effectiveness since surface and subsurface soil exceeding health-based cleanup levels in OU1 are excavated, treated as required on-site, and disposed of off-site in a permitted RCRA landfill.

Under Alternative 8, contaminated soil would remain below the depth of two feet in the commercial/industrial areas (except the Abex Lot, which would be excavated down to the water table). Contaminated soil beneath existing permanent covers such as buildings, parking lots, sidewalks, and streets would also remain in place (except beneath the following existing permanent covers: asphalt on the Abex Lot, the McCready Lot, and the Holland Property, the former foundry buildings on the Holland Property, and the Effingham and Seventh Street homes). Therefore, the residual risk associated with Alternative 8 would be higher than that of Alternative 4 and Alternative 8 would be considered a slightly less permanent remedy than Alternative 4. By excavating from the ground surface down to two feet in the commercial/industrial areas, most of the contaminated soil will be removed from the Holland Property and from the vacant lots, according to the data that was obtained during the RI. Institutional controls would be implemented to prevent future exposure to contaminated soil that remains. Overall, Alternative 8 provides for a high degree of long-term effectiveness.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Lead, the primary contaminant of concern at the Site, is a metallic element that cannot be destroyed to reduce its toxicity. Therefore, remedies addressing lead contamination in soil generally require either removal and/or stabilization by immobilizing the lead within the soil structure, thereby reducing the mobility of the contaminant. Stabilization, however, results in an increase in the volume of material to be addressed and will not reduce the toxicity of the lead.

Under Alternative 4, surface and subsurface soil above the water table that is contaminated with lead above health-based cleanup levels would be excavated, treated (as appropriate) to reduce the mobility of lead in the soil, and removed for off-site

disposal. For soil that is treated by stabilization, the mobility of the lead will be reduced, but the volume of the lead-contaminated soil will increase due to the addition of stabilizing agents.

Under Alternative 8, soils which exceed health-based cleanup levels would be excavated and treated, as appropriate, down to the water table in residential areas and the Abex Lot, and to a depth of two feet in remaining commercial/industrial areas to reduce the mobility of the lead in the soil. The contaminated soil will be moved for off-site disposal. Relatively small quantities of contaminated soil are expected to remain below two feet in commercial/industrial areas or beneath permanent covers such as buildings, parking lots, sidewalks, and streets. In addition, the mobility of lead in the soil is known to be low. Therefore, Alternative 8 is considered to achieve the same reduction in toxicity through treatment as Alternative 4.

5. Short-Term Effectiveness

The primary short-term effects associated with both Alternatives are potential exposure to contaminated dust generated during excavation and exposure to physical safety hazards that exist around heavy equipment. Air-borne dust containing elevated lead levels could be generated during soil excavation required in Alternatives 4 and 8. The extent of soil excavation is greater under Alternative 4 and, thus, the potential for exposure to contaminated dust could be greater. Additional dust could be generated during soil handling and operation of soil treatment units on-site. However, measures will be taken to control dust during implementation of either of the Alternatives. These measures will be detailed in the Remedial Action Work Plan and the associated Health and Safety Plan which must be prepared and approved by EPA prior to initiation of construction. Measures to be performed would include: (1) dust suppression during excavation, handling, and treatment activities; (2) sampling the interior of housing units for contaminated dust before, during, and after remedial activities to ensure dust suppression has been effectively implemented; and (3) air monitoring for both lead and dust before and during remedial activity.

Alternatives 4 and 8 would require temporary relocation of residents during excavation and treatment of contaminated surface and subsurface soil around their residential units. This action would be taken to minimize the physical safety hazards associated with heavy equipment operating in close proximity to residential property. Details on the extent of excavation required for each residential unit and the arrangement for temporary relocation would be discussed with impacted residents during the remedial design process.

Both Alternatives require on-site treatment of excavated soils. The Remedial Action Work Plan and Health and Safety Plan would detail measures to be taken to secure the areas where soil is stored prior to and during treatment to prevent air or water-borne releases of contaminated soil and to prevent access by local children. In addition, the on-site soil treatment unit will be housed in a temporary structure to minimize exposure to the elements and the opportunity for any releases.

6. Implementability

Alternative 4, as proposed in the 1992 ROD, called for extensive excavation of contaminated surface and subsurface soil, including contaminated soil that exists adjacent to foundations and/or beneath homes or residential units. Due to the unstable nature of soil or fill material around or under many of the impacted residences and the proximity of the water table to the ground surface (estimated at 3 to 6 feet), strict engineering practices would need to be followed to prevent structural damage to the homes during excavation. It was noted in the September, 1992 ROD that such excavation may in fact prove technically impracticable upon further investigation.

For both Alternatives 4 and 8, implementation of on-site treatment will require careful planning and additional construction activities. In each case, treatability studies will be necessary to determine the appropriate mixture of reagents needed to effectively immobilize the lead in the soil.

Alternative 8 also requires extensive excavation of contaminated surface and subsurface soil, although the depth of excavation is reduced in commercial/industrial areas (except the Abex Lot). Under Alternative 8, institutional controls would have to be used to prevent future exposure to contaminated soil that remains two feet or more below the surface, as well as contaminated soil beneath existing permanent covers.

Neither Alternative would require excavation beneath permanent covers such as buildings without crawl spaces, parking lots, sidewalks, and streets.

Both Alternatives 4 and 8 are considered remedies that can be readily implemented, although Alternative 4 may be more technically difficult, depending upon the extent of contaminated soil found under homes, and the engineering measures which would be employed to excavate, if technically feasible.

7. Cost

The estimated present worth cost of Alternatives 4 and 8, are \$31,962,923 and \$31,507,670, respectively.

Modifying Criteria:

8. State Acceptance

The Commonwealth has reviewed and commented on the Proposed ROD Amendment. The Commonwealth's comments have been incorporated into the ROD Amendment.

9. Community Acceptance

During the public comment period, most of the community expressed their approval of Alternative 8. However, some residents living in Washington Park continue to express their desire to be permanently relocated. The Portsmouth Redevelopment and Housing Authority (PRHA) offered permanent relocation to other public housing within the City to those residents who have concerns about their health or the health of their families.

The residential homeowners are also in support of Alternative 8, but have requested that EPA intervene if they do not get what they consider to be fair market value for their homes from the PRPs. As noted above, the City informed EPA of its intention to rezone the Effingham Playground, Seventh Street row home area, and the Effingham Residential area from residential to light commercial/industrial and purchase the homes for demolition. The decision to rezone, purchase, and demolish the homes is a local governmental function and outside the jurisdiction of EPA. During the public meeting and public availability sessions on the Proposed Plan, EPA explained to the residents and PRPs that the negotiations for purchasing homes will be between the PRPs and the homeowner. EPA does not have direct involvement in this process.

The City and the PRHA support Alternative 8, except that they have requested that the areas that the City plans to rezone to commercial/industrial, i.e., the Effingham Playground and Effingham residential area, Seventh Street row home area, portions of Lincoln and Green Streets, be excavated down to a depth of one foot instead of two feet. They have stated that excavation to one foot in these areas is protective because the area will be permanently covered by a police headquarters building and parking lots to be built on these areas. EPA has determined that since these areas are not currently permanently covered and because they will be excavated for demolition and construction activities anyway, excavation of contaminated soil down to a maximum of two feet throughout the areas is appropriate.

and consistent with the standards established throughout this Amended ROD. Further, it is EPA's position that excavation of lead-contaminated soil down to one foot is not protective of human health in these areas due to the close proximity of residents living in the Washington Park Housing Development.

X. SELECTED REMEDY AND PERFORMANCE STANDARDS

Based upon consideration of the requirements of CERCLA, the detailed analysis of the Alternatives using the nine criteria and public comments, EPA has determined that Alternative 8 is the most appropriate remedy for the Abex Superfund Site. The major components of the remedy and the required performance standards are listed below.

A. Soil Excavation

1. Performance Standards:

- Soil exceeding 500 mg/kg lead in areas zoned for residential use at the completion of the preliminary remedial design and in the Abex Lot shall be excavated to the water table. To the extent practicable, such excavation shall be performed when the water table is at the seasonally low elevation.
- Soil exceeding 500 mg/kg lead in the first foot and 1,000 mg/kg lead at depths between one and two feet shall be excavated in areas zoned for commercial/light-industrial use (except for the Abex Lot) as of the completion of the preliminary remedial design; this includes soil in the areas to be rezoned (i.e., the Effingham Playground, the Effingham residential area, and the Seventh Street row homes).
- Institutional land-use controls shall be implemented to control any future excavation below the depth of two feet in commercial/industrial areas to prevent exposure to contaminated soil. EPA shall review, comment upon, and approve all institutional controls to be implemented as part of the remedial action for the Site. These institutional controls may include: an ordinance or regulation requiring a permit for, and imposing restrictions on, excavation in areas within OUI and requiring notice to EPA, the City, PRHA, and the public prior to excavation in such areas; the inclusion of provisions in deeds for properties within OUI providing notice of this CERCLA remedy and restricting excavation on such properties; and the placement of underground "warning sheets" in excavated commercial/industrial areas before backfilling with clean soil. The institutional controls shall be

sufficient to ensure (1) that soils below two feet are not disturbed in areas of OU1 zoned commercial/ industrial after completion of this remedy without prior notice to EPA, the City, PRHA, and the public, and (2) if such soils are to be disturbed, the soils shall be managed in a manner which will not endanger public health or the environment.

- Soil beneath existing permanent covers (such as buildings without crawl spaces, parking lots, sidewalks, and streets), will not be removed. These covers shall be maintained and EPA-approved institutional land-use controls shall be used to prevent future exposure to contaminated soil beneath these covers. The following existing permanent covers are not included in this provision and shall be removed as part of the remedy: the asphalt covers on the Abex Lot, the McCready Lot, and the Holland Property, the former foundry buildings on the Holland Property, and, if rezoning occurs, the Effingham and Seventh Street residential homes. Contaminated soil beneath these covers shall be excavated.

2. Additional Components:

- Temporary relocation shall be provided to residents while excavation is occurring around residential units. The extent of soil to be removed around each residential unit under this ROD Amendment shall be determined during the remedial design phase. The specific arrangements for temporary housing shall be based on the extent of soil to be removed and the needs of the impacted residents. Efforts shall be made to minimize inconvenience to residents. To the extent practicable, the U.S. Department of Transportation Uniform Relocation Act and accompanying regulations will be used as guidelines.
- Dust suppression measures shall be used to prevent contaminated dust from rising into the air and from entering homes or adjacent areas. Sampling of the interior of nearby homes shall be performed before, during, and after excavation to ensure that dust control measures have been effective. Air monitoring for lead and dust shall be performed in accordance with 40 C.F.R. Part 50, Appendix G, to ensure air emissions conform with the National Primary and Secondary Ambient Air Quality Standards for lead, 40 C.F.R. § 50.12, and particulate matter, 40 C.F.R. § 50.6, and for the control of fugitive dust emission in accordance Virginia Air Pollution Control Board Regulations, VR § 04-0101.

- Erosion and sediment control measures shall be installed in accordance with the substantive requirements of the Virginia Erosion and Sediment Control Law, Code of Virginia §§ 10.1-560 et seq., the Virginia Erosion and Sediment Regulations, VR § 625-02-00, and the City of Portsmouth's Erosion and Sediment Control Ordinance.
- All excavated areas shall be backfilled with clean fill; areas vegetated prior to excavation shall be restored to original conditions, to the extent practicable.
- Additional sampling and analysis of soil shall be performed prior to excavation to determine the full extent of contamination. Sampling and analysis shall also be performed after excavation has been completed to confirm that cleanup levels set forth in the performance standards have been achieved. Methods for determining that the cleanup goals have been reached shall be finalized during remedial design and approved by EPA based on EPA 230/02-89-042, Methods for Evaluating the Attainment of Cleanup Standards, Vol. I.
- Excavated soil and waste materials shall be temporarily staged on-site in accordance with 40 C.F.R. Part 264, Subpart L, and VR §10.11, Waste Piles, prior to treatment and/or transportation to an off-site disposal facility. To the extent practicable, excavated soil and waste material shall be staged in areas of existing contamination, e.g., the Abex Lot, the Holland Property, McCready Lot, or the vacant lots. Containment measures, such as berms and temporary covers, shall be used in areas with staged material to ensure that there are no unacceptable air or water-borne releases of contamination from these areas. These measures shall be sufficient to provide such protection in the event of flooding. Areas that are used to stage excavated material shall be secured with a fence to prevent trespassing.
- When the final areas of contamination are being addressed, excavated soil and waste materials may need to be staged in an areas where cleanup has previously occurred. In all instances where soil and waste materials are staged in areas where cleanup has previously occurred, or are otherwise not contaminated above levels requiring excavation, soil and waste material shall be staged in containers in accordance with RCRA regulations contained in 40 C.F.R. Part 268.50; containers used shall be in compliance with 40

C.F.R. Part 246, Subpart I and VR §10.8 Use and Management of containers.

B. Soil Treatment And Disposal

1. Performance Standards:

- Excavated soil and waste materials shall be tested using TCLP to determine if they exhibit toxicity, as defined in 40 C.F.R. Part 261, Subpart C. Contaminated soil and waste materials that do not exhibit toxicity shall be disposed of off-site at a permitted RCRA Subtitle D landfill.
- Soil and waste material that exhibits toxicity due to the leaching of lead or other metals of concern shall be handled as a RCRA hazardous waste, as defined in 40 C.F.R. Part 261, Subpart C. Such material shall be treated prior to disposal using a stabilization process that mixes the excavated soil and waste materials with chemical/reagents to create a final product that encapsulates and immobilizes lead and other metals. Specific chemicals to be used the process shall be determined in a treatability study during the remedial design phase of this project. Mixing shall be contained in above-ground equipment on-site in accordance with VHWMR §10.9, Tanks.
- Treated material shall be tested using TCLP to ensure that it no longer exhibits toxic characteristics. Treated material that continues to exhibit toxicity shall either be subject to additional treatment to further reduce toxicity, or disposed of off-site in an approved RCRA Subtitle C landfill, after RCRA land disposal restriction requirements have been met. Treated material that no longer exhibits toxicity using TCLP shall be disposed of off-site in a permitted RCRA Subtitle D landfill. If a disposal facility in Virginia is used, the treated waste is considered a "special waste" under Part VIII of VSWMR and specific approval from VDEQ's Director shall be obtained prior to disposal.

2. Additional Components:

- Air monitoring for lead and dust shall be performed in accordance with 40 C.F.R. Part 50, Appendix G, to ensure air emissions conform with the National Primary and Secondary Ambient Air Quality Standard for lead, 40 C.F.R. § 50.12, and particulate matter, 40 C.F.R. § 50.6. Air monitoring shall be done before, during and after the remedial work. Fugitive dust emissions shall

also be controlled in accordance with Virginia Air Pollution Control Board Regulations, VR § 04-0101.

- The on-site soil treatment unit shall be housed in a temporary structure to minimize exposure to the elements and the opportunity for air or water-borne releases.
- Treated material that no longer exhibits toxicity using TCLP shall be staged on-site in containers in preparation for transportation. Treated material that continues to exhibit toxicity shall be staged in accordance with the same requirements described above for staging untreated excavated soil and waste materials.
- Any transportation of hazardous waste from the Site shall be performed in accordance with VHWMR Part VII, Regulations applicable to Transporters of Hazardous Waste and RCRA requirements, as defined in 40 C.F.R. Parts 262, 263, and 268, and 49 C.F.R. Parts 107, and 171 -179. Any local roads damaged by the increased truck traffic associated with the remedial action shall be repaired in a timely manner following the conclusion of the on-site activity.
- Any off-site discharge of water generated from the on-site soil treatment system or from Site decontamination activities shall be in compliance with the Virginia Surface Water Standards and the Virginia Pollution Discharge Elimination System (VPDES) requirements. Any disposal of wastewater at a local Publicly-Owned Treatment Works (POTW) shall be in compliance with the POTW's VPDES permit and pre-treatment standards or requirements.
- Any treatment and/or storage units used during the remedial action (i.e., waste piles, tanks or containers for storage or treatment) that are regulated under VHWMR/RCRA requirements shall meet the closure and post-closure care requirements of 40 C.F.R. Part 264, Subpart G and VR §9.6, Closure and Post-Closure.

C. Building Demolition

1. Performance Standard:

- All existing structures on the Holland Property associated with the former foundry operations, the Effingham residential lots and the Seventh Street row home lots shall be demolished. Debris resulting from such demolition which exhibits toxicity using TCLP

shall be decontaminated in accordance with RCRA land disposal restriction requirements effective at the time when demolition occurs. Debris which continues to exhibit toxicity after decontamination shall be disposed of in a permitted RCRA Subtitle C landfill. Debris that does not exhibit toxicity shall be disposed of in a permitted RCRA Subtitle D landfill.

2. Additional Components:

- Equipment which is contaminated with or constitutes a RCRA hazardous waste shall be disposed of off-site in accordance with the requirements of RCRA Subtitle C, including the LDR requirement. Equipment which is not contaminated with or is not a RCRA hazardous waste, or which is decontaminated so that it no longer is contaminated with or constitutes a RCRA hazardous waste, may be used or disposed of off-site in a manner not inconsistent with applicable laws or regulations. Residuals generated as a result of decontamination activities shall be tested under TCLP and disposed of as required by RCRA Subtitle C and any other laws or regulations which may be applicable to such wastes.

XI. STATUTORY DETERMINATIONS

EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA, 42 U.S.C. § 9621, establishes several other statutory requirements and preferences. Under this Section, the selected remedy for the Site, when completed, must comply with ARARs established under Federal and State laws unless a statutory waiver is justified. The selected remedy must also be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity or mobility of contamination as their principle element. This Section discusses how the selected remedy meets these statutory requirements.

A. Protection of Human Health and the Environment

At the time the baseline risk assessment was done, the baseline risk assessment determined that surface soil contamination at the Site presented a current unacceptable risk to residents and would pose unacceptable risks to workers within the former foundry building. The average lead concentration exceeded 400 mg/kg in surface soil in the Effingham residential area, on the Holland Property, and in the vacant lots. The Site

would also pose an unacceptable future risk to residents as a result of potential exposure to contaminated subsurface soils. Average lead concentrations exceeded 400 mg/kg in subsurface soil in the Washington Park development, the Effingham residential area, the Seventh Street row homes, the Holland Property, the Abex Lot, the drug rehabilitation center, and the vacant lots. At the present, the foundry buildings are not in use, and have been secured to restrict access. One foundry building has been dismantled due to its poor structural condition. In addition, CERCLA removal actions were performed in which lead-contaminated surface soil exceeding 500 mg/kg lead was excavated from the Washington Park Development, the Effingham Playground, and the Seventh Street Row Homes. The Effingham residents were informed of the human health risks posed by exposure to lead-contaminated surface soil on their property. They chose to wait for the long-term Site remediation to have both the lead-contaminated surface and subsurface soil excavation work done at the same time. The removal actions alleviated the current risks to Site residents (except for Effingham homeowners) being exposed to lead-contaminated surface soil, however, they did not eliminate the future risks posed by subsurface lead-contaminated soils. This remedy will address the future risk.

B. Compliance With Applicable or Relevant and Appropriate Requirements (ARARs)

Under Section 121 (d) of CERCLA, U.S.C. § 9621(d), and EPA guidance, remedial actions at Superfund sites must attain legally applicable or relevant and appropriate Federal and state environmental standards, requirements, criteria, and limitations (collectively referred to as ARARs). Applicable requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state law that specifically address hazardous material found at the site, the remedial action to be implemented at the site, the location of the site, or other circumstances at the site. Relevant and appropriate requirements are those which, while not applicable to the site, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well suited to that site.

The selected remedy will comply with ARARs and To Be Considered Materials (TBCs). The ARARs and TBCs are presented below.

1. CHEMICAL-SPECIFIC ARARs

- The Resource Conservation and Recovery Act, (40 C.F.R. Parts 261-270); the Virginia Waste Management Act (Code of Va. §§ 10.1-1400 et seq.); the Virginia Waste Management Regulations (VR §672-10-1); and the Virginia Solid Waste

Management Regulations (VR § 672-20-10). These provisions regulate the transportation, treatment, storage, and disposal of hazardous wastes that occur during the cleanup.

- Clean Water Act; National Pollution Discharge Elimination System requirements, (40 C.F.R. Part 122); the Virginia Water Control Law (Code of Va. §62.1-44.2 et seq.); and the Virginia State Water Control Board regulations (VR §680-21-00). These regulate any discharge of wastewater generated during the cleanup to the waters of the Commonwealth of Virginia.
- National Primary and Secondary Ambient Air Quality Standards for Lead (40 C.F.R. Part 50.12) and for Particulate Matter (40 C.F.R. Part 50.6); and the Virginia Air Pollution Control Law (Code of Va. §10.1-1300 et seq.), and the Virginia regulations for the Control and Abatement of Air Pollution (VR §120-01) regulate air emissions and establish permissible levels of lead and particulate matter that can be released into the environment during the cleanup activities.

2. LOCATION-SPECIFIC ARARS

- Executive Order 11988, Floodplain Management; the National Flood Insurance Act of 1968; the Flood Disaster Act of 1973; and Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Environmental Policy Act. These provisions regulate cleanup activities because they take place in a floodplain.
- Coastal Zone Management Act, 16 U.S.C. §§1451 et seq.; the Coastal Management Plan for the City of Portsmouth; and the National Oceanic and Atmospheric Administration (NOAA) Regulations on Federal Consistency With Approved State Coastal Zone Management Programs. These provisions regulate cleanup activities because they take place in a cleanup coastal area.
- Virginia's Chesapeake Bay Preservation Act (Code of Va. § 10.1-2100 et seq.) and Chesapeake Bay Preservation Area Designation and Management Regulations (VR § 173-02-01) regulate cleanup activities that take place in resource management and/or research protected areas as designated in the the Chesapeake Bay Preservation Act.

3. ACTION-SPECIFIC ARARS

- Virginia Erosion and Sediment Control Law (Code of Va. §10.1-560 et seq.) and the Virginia Erosion and Sediment Control Regulations (VR §625-02-00). These provisions

require control measures during earth-moving activities to prevent erosion and transport of sediment in surface water runoff.

- 40 C.F.R. Part 50, Appendix G establish protocols for air monitoring to be conducted during the cleanup.
- 40 C.F.R. Part 264, Subpart I, and VHWMR Section 10.8 Use and Management of Containers regulate the use of containers for storing and/or treating hazardous wastes during the cleanup.
- 40 C.F.R. Part 264, Subpart J, and VHWMR Section 10.9, Tanks regulate the use of tanks for storing and/or treating hazardous wastes during the cleanup.
- 40 C.F.R. Part 264, Subpart L, and VHWMR Section 10.11, Waste Piles regulate the use of waste piles for storing and/or treating hazardous wastes during the cleanup.
- 40 C.F.R. Part 268, Subpart E, Prohibitions on Storage regulates the storage of hazardous waste restricted from land disposal.
- 40 C.F.R. Part 262, 263, and 268, 49 C.F.R. Parts 171-179, and VHWMR Part VII, and the Virginia Regulations Governing the Transportation of Hazardous Materials (VR §672-30-1) regulate the transportation of hazardous wastes in the Commonwealth of Virginia and will be relevant and appropriate requirements for the on-site shipment preparation of Special Wastes to be transported off-site.
- Virginia Solid Waste Management Regulations, Part VIII, regulate disposal of "Special Wastes" generated during the cleanup in the Commonwealth of Virginia RCRA Subtitle D solid waste landfills.
- Occupational Safety and Health Administration Act (OSHA), 29 C.F.R. Parts 1910, 1926, and 1904, regulate health and safety requirements for workers during the cleanup.

C. Criteria, Advisories, or Guidance To Be Considered (TECs):

- Interim Guidance on establishing Soil Lead Clean-up Levels at Superfund Sites (EPA OSWER Directive 9355.4-02) recommends use of the UBK Model and appropriate assumptions to develop soil clean-up levels for lead.
- Methods for Evaluating the Attainment of Cleanup Standards, Vol. I (EPA 230/02-89-042) recommends statistical methods to confirm soil clean-up levels have been achieved.

D. Cost Effectiveness

Alternative 8 is less expensive than the remedy (Alternative 4) selected in the 1992 ROD. EPA believes that Alternative 8 will eliminate unacceptable risks to human health at the Site at an estimated cost of \$31,507,670 and, therefore, provides an overall benefit proportionate to its costs.

E. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

Section 121(b) of CERCLA, 42 U.S.C. § 9621(b), establishes a preference for remedial actions that permanently and significantly reduce toxicity, mobility, or volume of hazardous substances over remedial actions which will not. EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner to control contamination at the Abex Site. Of those alternatives that are protective of human health and the environment and comply with the ARARs, EPA has determined that Alternative 8 provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element, and state and community acceptance.

Alternative 8 also treats lead-contaminated soils that exhibit toxicity, as determined using TCLP, thereby achieving significant reduction of the mobility of lead in soil. The selection of treatment of the contaminated soil is consistent with program expectations that indicate that highly toxic wastes are a priority for treatment and often necessary to ensure the long-term effectiveness of a remedy.

F. Preference for Treatment as Principal Element

By treating the contaminated soil determined to exhibit toxicity by TCLP testing, Alternative 8 addresses the principal threats posed by the Site through the use of treatment technologies and satisfies the statutory preference for remedies that employ the treatment element.

XIII. DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes have been made to the remedy since its publication in the Proposed Plan to Amend the September 1992 ROD.

**RECORD OF DECISION AMENDMENT
ABEX CORPORATION SUPERFUND SITE**

PART III - RESPONSIVENESS SUMMARY

I. INTRODUCTION

During the public comment period on the Proposed Plan to Amend the September 1992 ROD for the Abex Site, EPA received three letters commenting on the cleanup alternatives. In addition, oral comments were recorded by a stenographer at the public meeting held on February 23, 1994, and tape recorded at the public availability sessions (meetings) held with local residents on February 22, 1994. EPA has carefully reviewed these comments and organized them into the following major categories:

- Migration of lead under covered areas
- Excavation of lead exceeding 500 mg/kg under buildings and parking lots controlled by the local government to a depth of one foot
- Assurance that the Effingham and Seventh Street Row homeowners receive the same cleanup as provided in the original ROD if the homes are not purchased
- Assurance that homeowners are fairly compensated for their homes

EPA's responses to the public comments are presented below. Copies of the letters submitted to EPA are included in the Administrative Record and identified in the index of documents for the Administrative Record in Appendix A.

II. MIGRATION OF LEAD UNDER COVERED AREAS

- 1) One resident questioned how lead can be prevented from migrating from under covered areas, such as the drug rehabilitation center parking lot, and what the lead concentrations are at the drug rehabilitation center.

Response: The main concern regarding risks posed by lead contamination is that of direct exposure through ingestion (eating) and inhalation (breathing). Where areas are covered or capped, such as the drug rehabilitation center parking lot, there is an impervious barrier preventing human contact with soil at the ground surface and preventing rain and surface water from infiltrating into the underlying soil. In addition, transportation of contaminated soil by wind and water erosion is prevented by the impervious

covers. According to the results of groundwater samples obtained from monitoring wells installed at the Site during the RI, lead has not migrated much either laterally or vertically down to the underlying groundwater. This finding is not surprising as lead tends to bind to fine-grained materials in the soils and the contamination at this Site is due mainly from landfilling of foundry-contaminated soils. The well that was drilled directly into the highly contaminated Abex Lot did exceed EPA's recommended 15 ug/l cleanup level for lead in groundwater. The Abex Lot will be excavated to the 500 mg/kg lead level down to the water table. The covered areas will require maintenance to ensure that the remedy remains protective of human health and the environment. Results of samples obtained during the RI indicate that the highest concentrations of lead under the drug rehabilitation center parking lot are approximately 6,500 mg/kg lead.

III. EXCAVATION OF SOIL TO A DEPTH OF ONE FOOT

- 1) Letters from the City of Portsmouth (the City) and from the Portsmouth Redevelopment and Housing Authority (PRHA) requested that the revised ROD include language which "recognizes that excavation of 24 inches of soil will not be necessary at portions of the Site that will be under governmental ownership and control and on which permanent, non-residential structures, will be placed". The City supported this request with its statement that the City would be rezoning the three block area bounded by Green, Lincoln, and Effingham Streets and the Effingham Playground, from residential to industrial and imposing restrictions on excavation, deed restrictions and building codes. The City also stated that the City and/or the PRHA intends to take title to properties located in the existing Effingham residential area and build a police station and parking lot at that location.

Response: Under Alternative 8, soil exceeding 500 mg/kg lead in all areas zoned for commercial/industrial use, except the Abex Lot, would be excavated from the surface to a depth of one foot. Soil below one foot which exceeds 1,000 mg/kg lead in these areas will be excavated to a depth of two feet. Institutional land-use controls would be implemented to control future excavation below two feet and to prevent exposure to contaminated soil. EPA has determined that the two foot depth is necessary to protect human health and the environment in all commercial/industrial areas that do not have existing covers or where existing covers will be disturbed. The City's plans do not involve merely leaving these existing permanent covers in place. In fact, the construction of a police headquarters and parking lot will

require demolition and excavation activities. In addition, the close proximity of this area to residents living in the Washington Park Housing Development warrants this two foot level.

IV. HOMEOWNER'S CONCERN IF HOMES ARE NOT PURCHASED

- 1) Several residents voiced a desire to have the proposed ROD drafted so that the September, 1992 ROD (Alternative 4) remedy would be performed if, for some reason, proposed Alternative 8 is not implemented and their homes are to remain at the Site.

Response: EPA has selected Alternative 8 as the remedy for OU1. The City has proposed the rezoning from residential to commercial/industrial the Effingham residential area and the area of the Seventh Street row homes, as well as the Effingham playground. The PRPs plan to purchase the private residential properties in independent, arms-length transactions or acquisition by the City through eminent domain. If, for any reason, the rezoning does not occur by completion of the preliminary remedial design, then the residential health-based levels specified in the ROD Amendment must be met, .i.e., soil that contains lead in excess of 500 mg/kg will be excavated down to the water table. Homes having crawl spaces with dirt floors will require further investigations during the remedial design to determine an appropriate method to remediate the contaminated soil. Institutional controls will be required to prevent any future exposure to contaminated soil remaining beneath existing permanent covers on residential property.

V. FAIR COMPENSATION TO HOMEOWNERS

- 1) Several Effingham and Seventh Street row home residents voiced a concern about being fairly compensated for their homes.

Response: As explained to the residents during the availability sessions held on November 8-10, 1993, in Portsmouth, EPA has no jurisdiction regarding rezoning or the proposed home acquisitions and, therefore, cannot provide any assurances to residents in that regard. The City's October 19, 1993 letter entitled, "Revision to the Record of Decision" informed EPA that the City had begun to take actions to rezone three city blocks bordered by Effingham, Lincoln, Green Streets, and the Effingham Playground. The City informed EPA that this area will be rezoned from residential to industrial use, and that a

police headquarters building and associated parking lots would be built in that location. In addition, the City stated that the privately-owned homes in the Effingham residential area and the Seventh Street row homes would be acquired through arm's length purchases or acquisition by the City by eminent domain, if necessary.

As noted above, EPA conducted public availability sessions from November 8, 1993 to November 10, 1993 to solicit input from residents regarding the PRPs' proposed changes to the ROD, one of which was to purchase and demolish certain residences on Effingham and Seventh Streets. The private homeowners responded favorably to the proposal. During the public availability sessions and the public meeting, EPA informed affected residents that the rezoning and land-use issues, including any purchase of homes, were solely within the jurisdiction of local government and that EPA has no input into making these decisions.

VI. COMMENTS RECEIVED PRIOR TO THE PUBLIC COMMENT PERIOD

A letter was submitted by counsel representing certain individuals living in Washington Park in response to the proposals by the City, Abex, and the PRHA prior to the issuance of the Proposed Plan to Amend the September 1992 ROD and the opening of the public comment period. This letter will be addressed even though it was submitted prior to the statutory public comment period and addresses the PRPs' proposal (not EPA's Proposed Plan to Amend the September 1992 ROD).

- 1) The commentor acknowledges that no one is opposed to rezoning portions of the Site and locating police facilities in the rezoned area, but objects to the proposed excavation to one foot in this area as non-protective of Washington Park residents.

Response: As indicated above, EPA agrees with the commentor and is requiring excavation to a depth of two feet, i.e., soil exceeding 500 mg/kg lead will be excavated to one foot and soil exceeding 1,000 mg/kg lead will be excavated to a depth of two feet. EPA has determined that this additional foot will ensure that residents will not be exposed to lead-contaminated soil from normal activities such as planting in this rezoned area. Also, the Amended ROD calls for the implementation of institutional land use controls which will control all construction and excavation activities which could possibly result in the disruption of contaminated soil left below the two foot level.

- 2) The commentor suggests that the only solution to protect the health and safety of the Washington Park residents is to relocate all residents who live within or adjacent to the Site and that such a proposal enjoys widespread support.

Response: EPA has determined that the measures to be undertaken in the Amended ROD will protect the Washington Park residents from potential exposure to lead-contaminated soils. As described in detail above, excavation of any areas of the Washington Park development exceeding 500 mg/kg of lead will be down to the water table. Also, lead does not tend to migrate horizontally or vertically through soils. The groundwater beneath the Site is not potable and is, therefore, not a drinking source for Portsmouth residents⁷. All commercial/industrial areas will be excavated to a depth of two feet (except the Abex Lot, which will be excavated to 500 mg/kg lead to the water table) and all future construction activities within the Site will be strictly controlled by various institutional land-use controls. Further, at the various availability sessions and the public meeting held by EPA following issuance of the Proposed Plan to Amend the ROD, the majority of Site residents that attended these meetings indicated support for the Plan with a few Washington Park residents stating their continued desire to relocate. There has also been an offer made by the PRHA to relocate Washington Park residents to other available public housing in the Portsmouth area if they do not believe that Washington Park is safe for them or their families due to the lead contamination.

- 3) The commentor has also stated that EPA has not had any experience with dismantling contaminated equipment and/or buildings "right in the middle of a heavily populated area" and that neither the ROD nor the PRPs' proposal require adequate measures to protect Washington Park residents both during and after the dismantling of the foundry.

Response: EPA has had experience with dismantling and/or demolishing highly contaminated structures in residential areas. At the Austin Avenue Site in Lansdowne, Pennsylvania, EPA dismantled a warehouse that was highly contaminated with radiation and located in a residential neighborhood. EPA has already demolished one contaminated building at the Site. The following stringent precautions will be followed during demolition: dust suppression measures will be used to ensure that unacceptable releases of air-borne contamination do not occur; air will be monitored for both dust and lead levels during remedial

⁷ Further groundwater studies will be undertaken in Operable Unit 2.

activities to protect the health of on-site workers and the community. EPA and/or their representatives will be on-site during the demolition to ensure that activities proceed in accordance with approved requirements. If at any time there is an indication through visual observation or monitoring data that there are releases of contaminants above safe levels, immediate action will be taken to correct the situation and protect the health and safety of the residents.

- 4) The commentor suggests that the standard by which EPA determines whether relocation of residents will occur is "when [that] remedy is more cost-effective than cleanup measures."

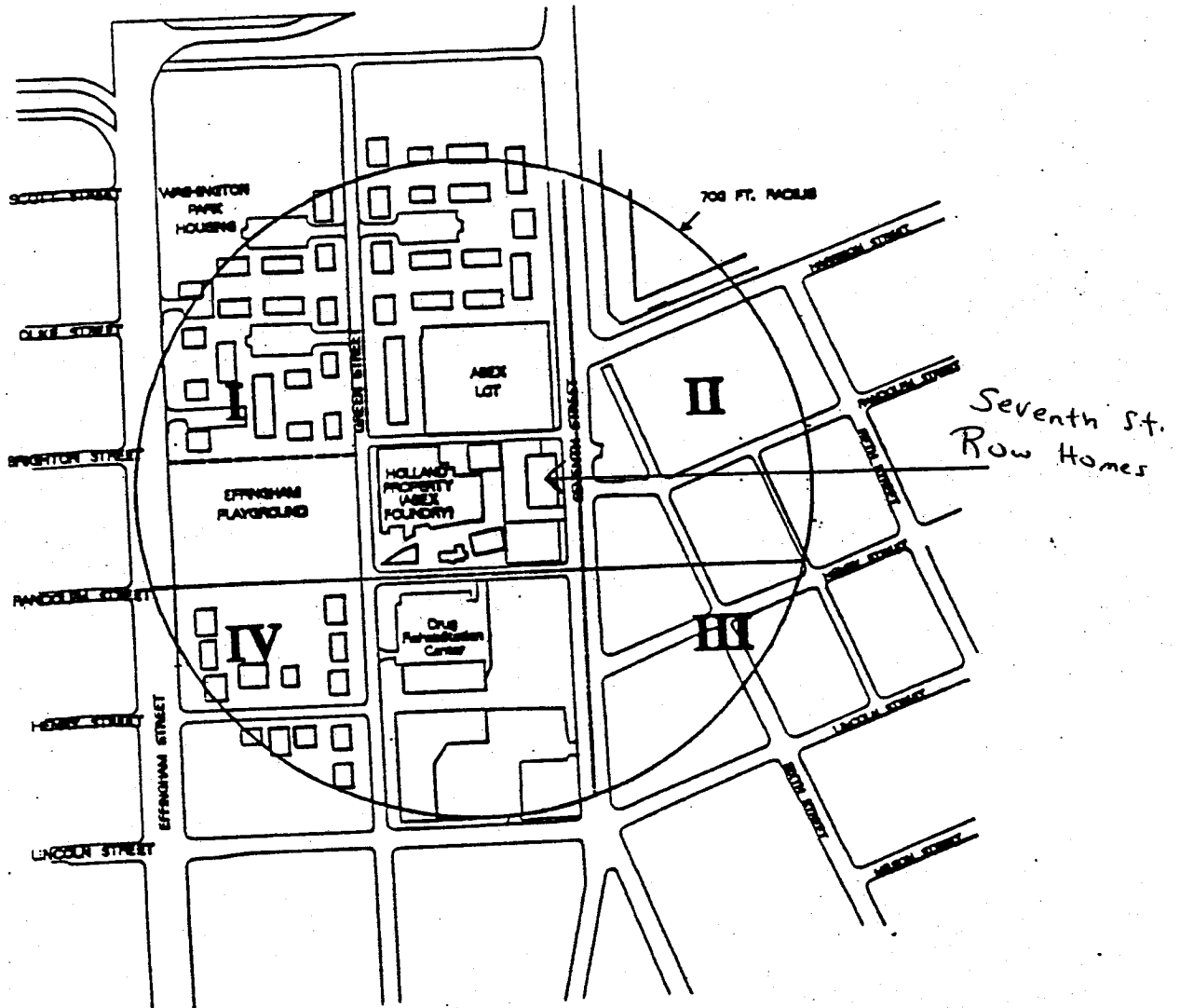
Response: There are nine criteria that EPA must evaluate in making its selection of a Site remedy (see 40 C.F.R. § 300.430(e)(9)(iii)). One of the nine criteria involves a determination of the cost effectiveness of the remedy, however, this provision also requires that the measure be "... protective of human health and the environment and meet[s] the other requirements of the statute." EPA carefully evaluated all of the nine criteria in selecting the preferred alternative selected in this Amended ROD. While the cost of relocation was investigated by EPA as part of the remedy selection process, permanent relocation is not part of the remedy because the Site remedy will be protective of human health and the environment and, therefore, there is no justification for permanent relocation. As a further protective measure designed primarily to ensure against problems associated with the use of heavy equipment in a residential setting, the Amended ROD provides for the temporary relocation of Washington Park residents during excavation activities near residents' particular units.

- 5) The commentor suggests an inequitable treatment of Washington Park residents versus independent homeowners at the Site due to the proposal by the City to buy certain homes located in the Lincoln, Green, Effingham, and Seventh Street area.

Response: The Amended ROD calls for the excavation of all soil exceeding 500 mg/kg lead to the water table in the Washington Park development. Institutional controls will be used to prevent excavation beneath the foundations of the units. The Effingham and Seventh Street homes will be demolished and the area cleared for the construction of a police headquarters and associated parking lots. The decision to rezone the Effingham and Seventh Street areas to commercial/industrial and purchase the homes for demolition was made by the City and not EPA. EPA, through this ROD

Amendment, is merely establishing health-based lead levels permitted in soils in areas based on a particular usage, i.e., residential versus commercial/industrial. The Washington Park residents will be fully protected by the excavation of contaminated soils above 500 mg/kg lead to the water table coupled with the use of institutional controls to prevent excavation beneath the housing units. If the rezoning and demolition does not occur, the Effingham and Seventh Street homes will be treated in the same fashion as the Washington Park units.

Appendix B
Map of the Site

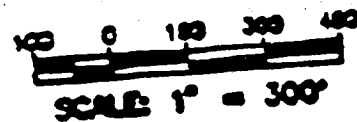


LEGEND

III

COASTS 1-10

----- COAST SURVEY



AR303598

Appendix C

List of the Settling Defendants

LIST OF SETTLING DEFENDANTS

Pneumo Abex Corporation

City of Portsmouth

Portsmouth Redevelopment and Housing Authority

Appendix D

Explanatons of Significant Differences

**EXPLANATION OF SIGNIFICANT DIFFERENCES
ABEX SUPERFUND SITE - PORTSMOUTH, VIRGINIA**

I. INTRODUCTION

Site Name: Abex Corporation Superfund Site

Site Location: Portsmouth, Virginia

Lead Agency: U.S. Environmental Protection Agency,
Region III ("EPA" or "the Agency")

Support Agency: VA Department of Environmental Quality
("VADEQ")

Statement of Purpose

A Record of Decision ("ROD") for the Abex Corporation Superfund ("Site") that addresses Operable Unit One ("OU1") was signed on September 29, 1992. This Operable Unit addresses contaminated soil and waste material present within an approximately 700-foot radius around the remains of the former Abex foundry facility located at the Site. The former foundry buildings will also be addressed as part of OU1. A Record of Decision Amendment ("Amended ROD"), which modified the selected remedy described in the 1992 ROD, was signed on August 15, 1994. This Explanation of Significant Differences ("ESD") is issued in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended ("CERCLA"). This ESD has been prepared to provide the public with an explanation of the nature of a change which has been made to the selected remedy set forth in the Amended ROD; to summarize the information that lead to the making of the change; and to affirm that the revised remedy complies with the statutory requirements of CERCLA Section 121, 42 U.S.C. § 9621. The proposed alternative does not fundamentally alter the remedy or performance of the remedy, and therefore a ROD amendment is not required. This ESD is incorporated into the Administrative Record for the Site.

**II. SUMMARY OF THE SITE HISTORY, SITE CONDITIONS, AND
SELECTED REMEDY**

The Abex Site (the "Site") is located in the eastern section of Portsmouth, Virginia, approximately 1.2 miles southwest of the confluence of the southern and eastern branches of the Elizabeth River. The Site is a former foundry which was operated to produce journal bearings for railroad cars between 1928 and 1978. The foundry has not been operated since 1978. A portion of the former foundry was used by Abex to dispose of furnace waste sand laden with heavy metals, including lead. Within OU1 is the former Abex brass and bronze foundry, which is comprised of five buildings (hereinafter referred to as the "Holland Property"),

and the former waste sand disposal areas (hereinafter referred to as the "Abex Lot") (See Figure 1).

Response actions began at this Site in 1986 when EPA identified high lead concentrations in the Abex foundry waste within the Abex Lot bounded by Seventh, Green, and Brighton Streets, and in soil of neighboring residential lots. Pursuant to a Consent Order signed with EPA in August of 1986, Abex Corporation ("Pneumo Abex")¹, one of the Potentially Responsible Parties ("PRPs") at the Site, excavated and removed contaminated soil at varying depths (generally 6 to 12 inches) from residential areas around the Abex Lot, primarily in portions of the Washington Park housing development (hereinafter "Washington Park development"), the Effingham Playground, and around the Seventh Street row homes (see Figure 1).

Additional high lead concentrations in soil in residential areas were identified in the Remedial Investigation and Feasibility Study ("RI/FS") conducted respecting OUI. The RI/FS was completed in February of 1992. The RI/FS demonstrated that the soils in the former foundry area, the Abex Lot, and certain soils in residential and non-residential areas contained elevated levels of lead, tin, copper, antimony, and zinc.

Pursuant to a Unilateral Administrative Order issued by EPA in March of 1992, Abex excavated and removed additional contaminated soil to a depth of approximately twelve inches in portions of the Washington Park development and the Effingham Playground. Excavation and removal of surface soil contamination in the Effingham residential areas as required by the March 1992 Order has not been completed because the homeowners in the two-block residential area south of the Effingham Playground have chosen to wait for the long-term remediation.

In April of 1992, EPA and the Commonwealth of Virginia ("the Commonwealth") published for public comment a Proposed Plan describing several proposed remedial alternatives for the Site. Public comments were received on the Proposed Plan and in September of 1992, EPA and the Commonwealth published a ROD selecting a final remedy for the Site. The preferred alternative selected in the September 1992 ROD (Alternative 4, with some minor modifications) required excavation down to the water table of soil exceeding 500 mg/kg of lead in residential areas and excavation down to the water table of soil exceeding 1,000 mg/kg of lead in commercial/industrial areas.

On October 19, 1993, Pneumo Abex submitted proposed changes to the ROD based on new information obtained from the City of Portsmouth (the "City") on proposed zoning and land-use plans for the Site and new institutional controls to be implemented with respect to future excavation within the Site area. EPA conducted

¹ Abex Corporation became Pneumo Abex Corporation in 1988.

public availability sessions from November 8, 1993 to November 10, 1993 to solicit input from the affected residents on the PRPs' proposed changes to the ROD. Public availability sessions are small meetings that provide individuals and small groups with an opportunity to meet with EPA to voice their opinions about Site issues. At the public availability sessions the private homeowners responded favorably to the proposal. Some of the Washington Park development residents continued to express interest in permanent relocation, however, the majority of the residents were generally supportive of the proposal. Both the City and the Portsmouth Redevelopment and Housing Authority ("PRHA") indicated their support for the 1993 Pneumo Abex proposal as well. After thoroughly evaluating the proposal and considering the responses to the proposal received from the affected residents during the November 1993 public availability sessions, EPA issued a Proposed Plan to amend the 1992 ROD with its revised preferred remedy and published Notice of the Public Comment Period on February 17, 1994 in the Virginian-Pilot/Ledger-Star.

EPA held public availability sessions on February 23, 1994 in Portsmouth during the 30-day public comment period on the Proposed Plan. EPA also held a public meeting on February 24, 1994 in Portsmouth to formally discuss the Proposed Plan and to receive comments.

The major components of the remedy set forth in the Amended ROD for OU1 are set forth below. The revised remedy is based on the contingency that: (1) the Effingham residential area, the Effingham playground, and the Seventh Street row homes will be rezoned commercial/industrial and will be occupied in a manner not inconsistent with such zoning classification; and (2) the institutional controls described in the remedy are in place no later than the completion of the preliminary remedial design for the remedy.

- In areas zoned for residential use at the date of completion of the preliminary remedial design, surface and subsurface soils located between the surface and the water table which contain greater than 500 mg/kg lead will be excavated. Soils exceeding 500 mg/kg lead in the Abex Lot will also be excavated to the depth of the water table.
- In areas zoned for commercial/industrial or other non-residential uses (except the Abex Lot) at the date of completion of the preliminary remedial design, soil located between the ground surface and one foot depth which contains greater than 500 mg/kg lead will be excavated, and soil between one foot and two feet which exceeds 1,000 mg/kg lead in industrial areas will be excavated. Institutional land-use controls will be implemented to control any future excavation below two feet and to prevent exposure to contaminated soil.

- EPA will review, comment upon, and approve all institutional controls to be implemented as part of the remedial action for the Site. These institutional controls may include: an ordinance or regulation requiring a permit for, and imposing restrictions on, excavation in areas within OU1 and requiring notice to EPA, the City, PRHA, and the public prior to excavation in such areas; the inclusion of provisions in deeds for properties within OU1 providing notice of this CERCLA remedy and restricting excavation on such properties; and the placement of underground "warning sheets" in excavated commercial/industrial areas before backfilling with clean soil. The institutional controls must be sufficient to ensure (1) that soils below two feet in areas of OU1 zoned commercial/industrial, as well as soils beneath permanent covers in all areas, are not disturbed after completion of this remedy without prior notice to EPA, the City, PRHA, and the public, and (2) if such soils are to be disturbed, the soils are managed in a manner which will not endanger public health or the environment.
- Soil beneath existing permanent covers such as buildings, parking lots, sidewalks, and streets will not be removed. These covers will be maintained and institutional land-use controls will be used to prevent future exposure to contaminated soil beneath such covers. The following existing permanent covers are not included in this provision and will be removed as part of the remedy: the asphalt covers on the Abex Lot, the McCready Lot, and the Holland Property, the former foundry buildings on the Holland Property, and, if rezoning occurs, the Effingham and Seventh Street residential homes.

III. DESCRIPTION OF SIGNIFICANT DIFFERENCE

EPA has determined that a change in the remedy set forth in the Amended ROD is warranted. This change is a significant change as defined in § 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), therefore, preparation of this ESD is required. Further Amendment of the Amended ROD is not required. It does not require a modification to the Amended ROD since the change only affects a portion of the contaminated soil at the Site.

A. Description of the change

In the Amended ROD, the two block area that is bounded on the west by Effingham Street, on the south by Lincoln Street, on the east by Green Street, and to the north by the Washington Park Housing Development (the "Effingham two square block area") (see Figure 1) was to be rezoned commercial/industrial and remediated by excavating soil between the ground surface and one foot depth which contains greater than 500 mg/kg lead, and soil between one

foot and two feet which exceeds 1,000 mg/kg lead. Since the issuance of the Amended ROD, the City has committed to construct a permanent City facility on the Effingham two square block area. This permanent City facility would be a non-residential building, including necessary parking areas, owned, operated and maintained by the City to house a significant municipal function, e.g., a firehouse or a police station. Additionally, a permanent recreational facility could be constructed within the Effingham two square block area and would be owned, operated and maintained by the City. This recreational facility would be considered a part of the permanent City facility upon written approval by EPA. This permanent City facility would be constructed within four years and six months of the date of the entry of the Consent Decree.

Based on the foregoing, EPA is changing the remedy set forth in the Amended ROD to provide that, within the Effingham two square block area, if the permanent City facility is to be constructed, soil may be excavated to a depth no greater than necessary to construct the building, any parking area and the recreation facility. If construction of the permanent City facility is completed within four years and six months of the date of entry of the Consent Decree, the area where the permanent City facility is located will be treated as a "permanent cover" as set forth in the Amended ROD.

In the Effingham two square block area, soil containing lead greater than 500 mg/kg from the ground surface to one foot depth, and soil containing lead greater than 1,000 mg/kg from one foot to two feet deep, not covered by the permanent City facility, will be excavated, as is required in the Amended ROD. Institutional controls will be implemented in the Effingham two block area where soil exceeding 1,000 mg/kg will remain on Site, as is required in the Amended ROD.

B. Rational for Change

EPA has made the determination that a change to the Amended ROD is needed, that implementation of the remedy as described above could expedite the cleanup of the Site, and will avoid prolonged and complicated litigation based on information and facts described below:

1. Performance

The change in the implementation of the remedy will not affect the clean-up level of the soil or areas to be cleaned up outside of the Effingham two square block area at the Site. Because the City is planning to build a permanent City facility on part of the Effingham two square block area, EPA will treat that facility as it would a "permenant cover" as set forth in the Amended ROD. The soil cleanup levels for areas within the Effingham two square block area not part of the permanent City

facility will be cleaned up to the levels described in the Amended ROD.

2. Timing

The construction of the municipal facility will be completed within four years and six months of the entry of the Consent Decree. Accordingly, the six year time frame for implementation of the remedial action for OU1 will not be significantly affected by this change in the remedy.

3. Cost

The Amended ROD estimated that OU1 Site remediation could cost \$31,000,000. The current estimate for the remedy if the permanent City facility is built within the time frame set forth in the Consent Decree is approximately \$21,000,000. The proposed change in the remedy could result in a cost savings of \$10,000,000.

IV. PUBLIC PARTICIPATION

This ESD and the information upon which it is based have been included in the Administrative Record File for the Site. The Administrative Record also includes the Amended ROD and all documents that formed the basis for EPA's selection of the cleanup remedy for the Effingham two square block area. The Administrative Record is available for public review at the locations listed below:

U.S. EPA, Region III
841 Chestnut Building
Philadelphia, PA 19107

Portsmouth Public Library
Reference Section

Questions or comments on EPA's action and requests to review the Administrative Record can be directed to:

Ronnie M. Davis
Remedial Project Manager
U.S. EPA, Region III
841 Chestnut Building (3HW41)
Philadelphia, PA 19107
(215) 597-1727

V. SUPPORT AGENCY REVIEW

EPA has notified the VDEQ of the changes proposed in this ESD in accordance with 40 CFR § 300.435(c)(2).

VI. AFFIRMATION OF STATUTORY DETERMINATION

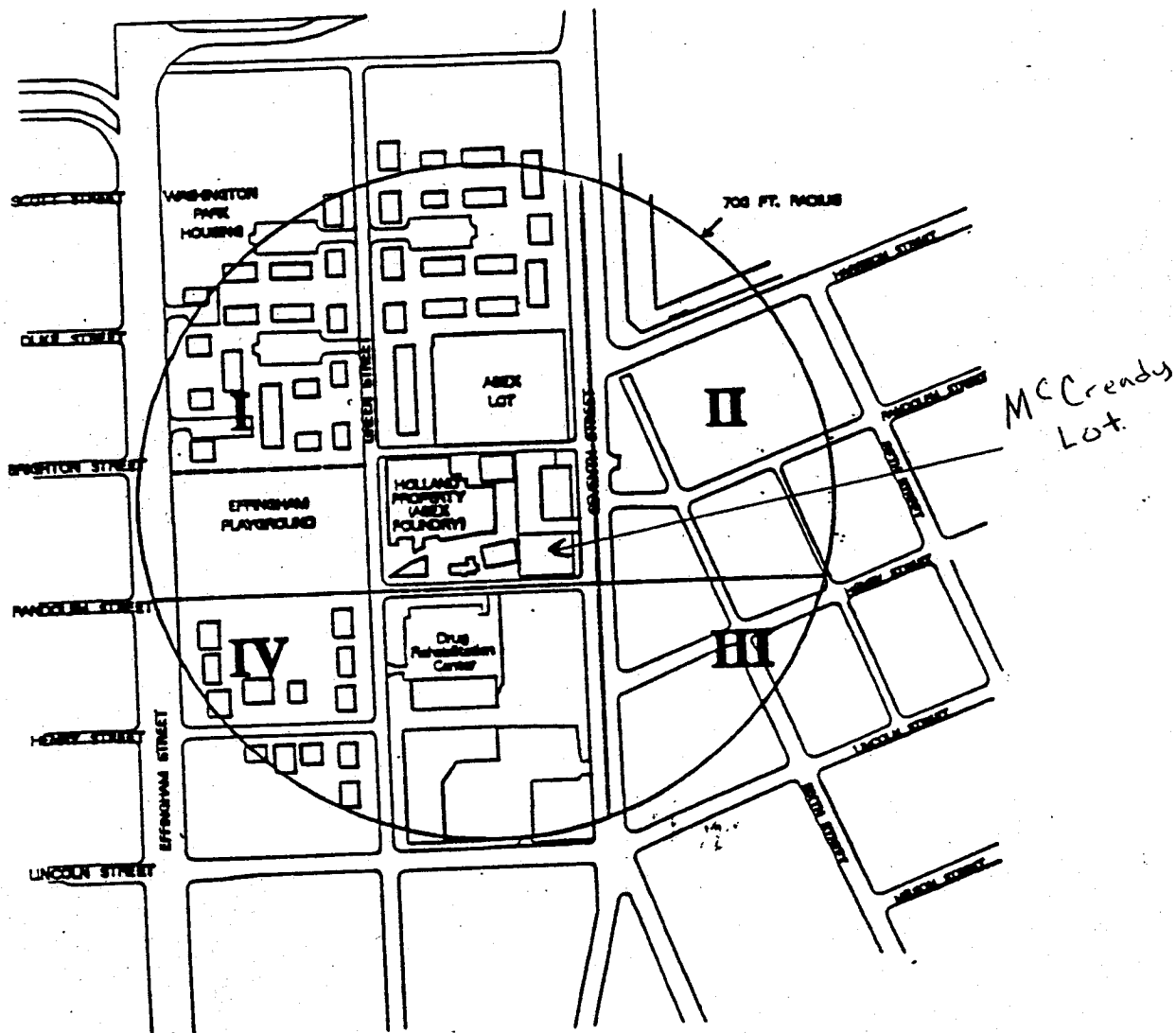
Considering the new information that has been developed and the changes that have been made to the scope of the selected remedy, the EPA believes that the remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable at this Site.

<

Thomas Voltaggio, Director
Hazardous Waste Management Division

12/5/85
Date

FIGURE 1 - MAP OF SITE FEATURES



LEGEND
III (CIRCLE 1-10)
 --- (CIRCLE 10-100)

100 0 100 200 300 400
 SCALE: 1" = 300'

AR303598

147306

**EXPLANATION OF SIGNIFICANT DIFFERENCES
ABEX CORPORATION SUPERFUND SITE
PORTSMOUTH, VIRGINIA
OPERABLE UNIT 1**

I. INTRODUCTION

Site Name: Abex Corporation Superfund Site

Site Location: Portsmouth, Virginia

Lead Agency: U.S. Environmental Protection Agency, Region III

Support Agency: Virginia Department of Environmental Quality (VADEQ)

EPA is issuing this Explanation of Significant Differences (ESD) for the Abex Corporation Superfund Site (Site) to change the area to which the commercial/industrial soil cleanup standards apply, based on a change in the anticipated land use for a portion of the Site from residential to commercial/industrial land use.

In 1999, the Washington Park Lead Committee and four individuals filed a civil rights lawsuit against the City of Portsmouth (City), the Portsmouth Redevelopment and Housing Authority (PRHA), Pneumo Abex Corporation (Abex), the U.S. Department of Housing and Urban Development (HUD), and the U.S. Environmental Protection Agency (EPA). EPA was named in the lawsuit at least in part because the Washington Park Public Housing Complex (Complex) is part of the Site. The lawsuit alleged that the Complex was knowingly built on contaminated property with the realization that only African-Americans would reside there. A settlement was reached in 2000 whereby HUD and PRHA agreed to permanently relocate all of the residents of the Complex. Also as part of the settlement, the City of Portsmouth and PRHA agreed to establish restrictions to prohibit the redevelopment of the Washington Park Property (WPP) for residential use. Since these restrictions are in place, all of the residents of the Complex have been relocated and other certain conditions in the settlement have been met, the City and PRHA, in accordance with the settlement, have requested that EPA change the soil cleanup standards for the WPP from residential cleanup standards to commercial/industrial cleanup standards. The current selected remedy contains different soil cleanup standards for areas in which the anticipated future land use is residential versus those areas for which the anticipated land use is commercial/industrial. EPA is issuing this ESD to modify the current remedy for the Site by applying the commercial/industrial cleanup standards to the WPP because the anticipated future land use for that area is now commercial/industrial.

This ESD is issued in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, (CERCLA), 42 U.S.C. § 9617(c) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Section 300.435(c)(2)(i). This ESD significantly changes, but does not fundamentally alter, the remedy selected in the Record of Decision Amendment (dated August 15, 1994), and a previously issued ESD (dated October 5, 1995) with respect to scope, performance or cost. This is the second ESD issued for the Site.

II. BACKGROUND

The Abex Corporation Superfund Site is located in the eastern section of Portsmouth, Virginia. Operable Unit 1 (OU1) of the Site encompasses a 12 to 14 square block area (see Figure 1). It contained a brass and bronze foundry, which comprised five buildings and associated waste sand disposal areas. The Site also includes some nearby areas surrounding the foundry, including the WPP.

The foundry was operated at the Site from 1928 to 1978. In the operation, used railroad car journal bearings were melted and poured into sand molds to cast new railroad car bearings. These sand casts eventually became laden with heavy metals, such as lead, antimony, copper, tin and zinc. Waste sand was disposed of in an approximately one acre area immediately north of the foundry building.

EPA proposed the Site for inclusion on the CERCLA National Priorities List (NPL) on June 24, 1988 (53 FR 23988). The Site was placed on the NPL on August 28, 1990 (55 FR 35502). In order to focus the cleanup on the worst areas, EPA and VADEQ (formerly VDWM, Virginia Department of Waste Management) divided the Site into two operable units (OUs). Operable Unit 1 addresses the contamination in the soils and waste sands on the former foundry property, and in the surrounding properties within an approximate 700-foot radius of the foundry facility (see Figure 1). Operable Unit 2 addresses the potential contamination of the groundwater and additional soil contamination that may exist beyond the approximate 700-foot radius being addressed in OU1. Note that all of the WPP is in OU1.

In September 1992, EPA issued a Record of Decision (ROD) for OU1. The selected remedial action for OU1 included excavation, treatment and disposal of the contaminated soil and waste material, demolition of the buildings associated with the former foundry operation, and use of permanent cover (streets, sidewalks, driveways, etc.) to cap the contaminated soil. The ROD included cleanup criteria for areas zoned residential (all soil from the ground surface to the water table with lead levels greater than 500 mg/kg shall be excavated) and cleanup criteria for areas zoned commercial/industrial (soil in the top one foot with lead levels greater than 500 mg/kg and in the second foot with lead levels exceeding 1,000 mg/kg shall be excavated and a warning liner installed before refilling with clean soil). On October 19, 1993, Abex submitted proposed changes to the ROD, based on a City of Portsmouth proposal to rezone part of the Site from residential to commercial/industrial use, to implement institutional controls to regulate future excavation in the area and to have PRHA permanently relocate some private homeowners. In August 1994, EPA agreed with the proposal and modified the ROD by issuing a ROD Amendment. In 1995, EPA further modified the ROD Amendment with an ESD because the City of Portsmouth proposed to construct a City facility in the former Effingham Playground and a section of the former Effingham residential area which would function as permanent cover. A more comprehensive discussion of the remedy and performance standards can be found in the August 1994 ROD Amendment and the 1995 ESD.

In 1997, Abex started implementing the ROD Amendment and the 1995 ESD with the demolition of the foundry buildings and several private homes (see Figure 1 for areas already

addressed as part of OUI). Abex halted soil excavation work at the WPP in December 1999 to allow the opportunity for the negotiations stemming from the civil rights lawsuit to continue. Ultimately, the civil rights lawsuit was settled by entry of a Consent Decree in April 12, 2000. The Consent Decree called for the continued suspension of work to allow the opportunity for certain conditions contained in the Consent Decree to be met, and for EPA to then propose to change the selected remedy using procedures which are not inconsistent with the NCP.

III. BASIS FOR THE DOCUMENT

The civil rights Consent Decree set forth the following preconditions to be met before EPA would propose to implement the processes described in the NCP for remedy modification:

- PRHA's application for demolition to be approved by HUD;
- All residents living in the Complex to be relocated;
- The City and PRHA to establish restrictions prohibiting the re-use of the WPP for residential purposes; and
- PRHA and the City to request EPA to modify the selected remedy to provide that the entire WPP be cleaned up to commercial/industrial standards instead of residential standards.

Recently, the City and PRHA requested that EPA modify the remedy. The City and PRHA have obtained approval for demolition of the Complex, have permanently relocated the residents and have established re-use restrictions for the WPP. Permanent relocation of the residents was a result of the civil rights settlement and was not part of EPA's cleanup of the Superfund Site. The selected remedy in the ROD Amendment, as modified by the 1995 ESD, is protective of human health and the environment. However, as part of the settlement, EPA agreed that it would propose to implement the processes described in the NCP for remedy modification in an effort to revise the remedy to apply the commercial/industrial standards contained in the ROD Amendment to the WPP. This remedy change is the subject of this ESD.

IV. DESCRIPTION OF SIGNIFICANT DIFFERENCE

EPA is issuing this ESD to describe changes to the remedy selected in the August 1994 ROD Amendment, as modified by the 1995 ESD, which result from a change in the anticipated land use. EPA, as a policy, considers reasonably anticipated future uses of the Site prior to remedy selection. Except for the specific changes discussed below, all terms of the August 1994 ROD Amendment, as modified by the 1995 ESD, remain in effect.

1. Remedy Change

The commercial/industrial cleanup criteria in the August 1994 ROD Amendment now apply to the WPP (see area labeled Washington Park Public Housing Complex on Figure 1). The residential cleanup standards in the August 1994 ROD Amendment previously applied to this

area. In general, the commercial/industrial cleanup criteria include soil excavation (where no permanent cover exists¹), institutional controls, soil treatment and soil disposal. See the ROD Amendment and the 1995 ESD for further details on the selected remedy and the performance standards for areas zoned for commercial/industrial use.

2. Overall Protection of Human Health and the Environment

The selected remedy set forth in the August 1994 ROD Amendment, as modified by the 1995 ESD, is protective of human health and the environment. The remedy modification called for in this ESD is also protective of human health and the environment.

3. Applicable or Relevant and Appropriate Requirements (ARARs)

This ESD does not fundamentally change the remedy, nor result in the addition of any new components to the remedy. Therefore, no new ARARs are being identified.

4. Cost Effectiveness

There is an approximate \$2 million savings as a result of this remedy change. As a condition of the civil rights lawsuit settlement, this savings, which will be realized by Abex (the company implementing the remedy) will be used to fund the demolition of the Complex, which is an activity outside the scope of the selected remedy.

V. SUPPORT AGENCY COMMENTS

EPA consulted with the representatives of VADEQ pursuant to 40 C.F.R. § 300.435(c)(2) regarding the remedy change. VADEQ reviewed the change to the selected remedy as described in this ESD and had no comment.

VI. PUBLIC PARTICIPATION COMPLIANCE

This document will be incorporated into the Administrative Record maintained for this Site as required by the NCP Section 300.825(a)(2). The Administrative Record File contains the information upon which the selection of the response action was based and is available at the following locations:

Portsmouth Public Library
601 Court Street
Portsmouth, Virginia 23704
(757) 393-8973

Monday - Thursday (10:00 am to 9:00 pm)
Friday - Saturday (10:00 am to 5:00 pm)

U.S. EPA Region III
6th Floor Docket Room
1650 Arch Street
Philadelphia, Pennsylvania 19103
(215) 814-3157
Monday - Friday (8:00 am to 4:30 pm)

¹ Note that since permanent cover is an integral part of the selected remedy, when the permanent cover is removed the area must be addressed by soil excavation performed in accordance with the EPA-approved institutional land-use controls.

VII. STATUTORY DETERMINATIONS

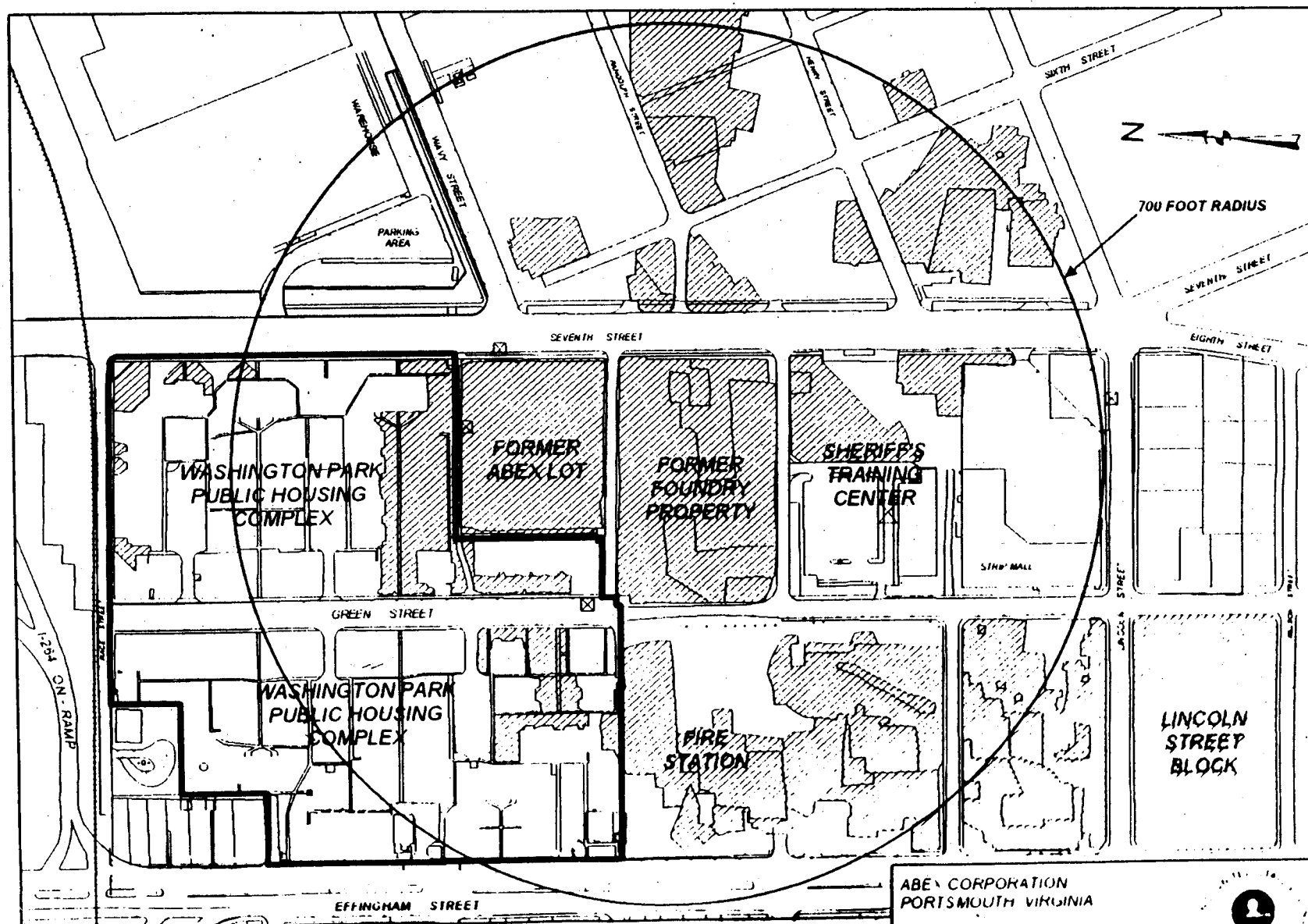
EPA has determined that the revised remedy complies with the statutory requirements of CERCLA § 121, 42 U.S.C § 9621. Considering the change that has been made to the selected remedy, EPA believes that the remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this Remedial Action and is cost-effective. In addition, the remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element.



Abraham Ferdas, Director
Hazardous Site Cleanup Division
EPA Region III

8/27/02

Date



LEGEND

 OU - 1 AREAS REMEDIATED

Notes

- 1 Lincoln Street Block - approximately 75% of the area was remediated
- 2 Washington Park Public Housing Complex is zoned for industrial use per zoning amendment number Z-01-11 as of January 22, 2002
- 3 From Haley & Aldrich map file 7-4065-002 A20

ABE CORPORATION
PORTSMOUTH VIRGINIA

FIGURE 1

SITE MAP

SCALE AS SHOWN

